TREES AND SHRUBS

B 10,00

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

VOLUME II

BOSTON AND NEW YORK
HOUGHTON MIFFLIN COMPANY
The Riverside Press, Cambridge
1913

PART I., Plates CI.–CXXV., issued September, 1907.
PART II., Plates CXXVI.–CL., issued May, 1908.
PART III., Plates CLI.–CLXXV., issued June, 1911.
PART IV., Plates CLXXVI.–CC., issued August, 1913.

TABLE OF CONTENTS.

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

VOL. II, PART I

Issued September 1907

BOSTON AND NEW YORK
HOUGHTON, MIFFLIN AND COMPANY
The Riverside Press, Cambridge
1907

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest*. The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts. The parts will be sold separately, at $5.00 *net*, carriage paid. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

HOUGHTON, MIFFLIN AND COMPANY

4 PARK STREET, BOSTON

TREES AND SHRUBS.

ULMUS JAPONICA, SARG.

ULMUS JAPONICA, *n. sp.*

ULMUS CAMPESTRIS, var. JAPONICA, Rehder, *Bailey Cycl. Am. Hort.* iv. 1882 (1902).

ULMUS CAMPESTRIS, var. LÆVIS, Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. 174, (*Fl. Sachalin.*) at least in part (not Walpers) (1868).

Leaves oblong-obovate, abruptly long-pointed at the apex, cuneate on one side and rounded on the other side of the gradually narrowed very unsymmetrical base, coarsely often doubly serrate, with straight or incurved teeth, thick to subcoriaceous, dark green, scabrate or nearly smooth, and slightly pubescent on the midribs and veins above, covered below with short pubescence most abundant on the stout midribs and numerous slender primary veins, from 8 to 12 centimetres long and from 3.5 to 7 centimetres wide; petioles stout, densely pubescent, from 7 to 10 millimetres in length. Flowers nearly sessile, light red; calyx-lobes only slightly ciliate; stamens four; anthers suborbicular. Fruit narrowly oblong-obovate, cuneate at the slender base, glabrous on the margins.

A tree, from 20 to 26 metres high, with a trunk often from 1 to 1.3 metres in diameter, a wide head of gracefully pendent branches, and slender slightly zigzag branchlets, pale yellow-green during their first season, becoming deeper colored, slightly tinged with red, and pubescent or glabrous in their second season, later sometimes developing narrow corky wings. Winter-buds obtusely conical, from 4 to 5 millimetres long, covered with dark red pubescent scales.

Japan: Hokkaido, near Hakodate at the foot of Mt. Koma-ga-take, *Maximowicz*, 1861 (in Herb. Gray); near Hakodate, *Albrecht*, 1861–63 (in Herb. Gray, fruit); Sapporo, *K. Miyabe*, May 1884 (flowers and young fruit), *C. S. Sargent*, September 18, 1892, *J. G. Jack*, August 19, 1905; Shiravi, *J. G. Jack*, August 24, 1905; Hondo, Chuzengi, *J. G. Jack*, August 13 and October 26, 1905; Saghalin, *Fr. Schmidt* (in Herb. Gray).

Ulmus Japonica in habit, foliage, and in its pubescence, resembles the eastern American *Ulmus Americana*, Linnæus. In its flowers and fruits and in its tendency to develop corky wings on the branches it is more like the European *Ulmus campestris*, Linnæus, although in the European species the anthers are oblong and the fruits are broadly cuneate or sometimes suborbicular. In the peculiar light yellow color of the branchlets in their first season it differs from both the American and the European species. Rare and found only at high elevations in Hondo, *Ulmus Japonica* is often a prominent feature of the vegetation in Hokkaido, where it is one of the common trees, growing on the river plains nearly at the sea-level and in the forests which cover the hills of the interior.[1]

Ulmus Japonica was raised at the Arnold Arboretum in 1905 from seed sent from Sapporo by Professor Miyabe. It has grown rapidly, producing flowers in the spring of 1907, and is perfectly hardy in eastern Massachusetts, where it promises to become an ornamental tree of the first class.

C. S. S.

[1] Sargent, *Garden and Forest*, vi. 323, f. 50; *Forest Fl. Jap.* 57, pl. 18.

EXPLANATION OF THE PLATE.

PLATE CI. ULMUS JAPONICA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A fruiting branch, natural size.
4. A fruit, enlarged.
5. End of a vigorous shoot, natural size.
6. A winter branchlet, natural size.

C. E. Faxon del.

ULMUS JAPONICA, Sarg.

CRATÆGUS INCÆDUA, SARG.

(Punctatæ.)

CRATÆGUS INCÆDUA, *n. sp.*

Leaves oblong-obovate to oval, acuminate or occasionally rounded at the apex, gradually narrowed to the long concave-cuneate entire base, and coarsely doubly serrate above, with straight or incurved glandular teeth; strigose above when they unfold and covered below with soft white hairs most abundant on the midribs and veins, more than half grown when the flowers open, and then thin, yellow-green, smooth, lustrous, and almost glabrous on the upper surface, and at maturity thin but firm in texture, dark yellow-green and very lustrous above, pale and villose below along the midribs and obscure primary veins, from 5 to 6 centimetres long and from 3 to 3.5 centimetres wide; petioles slender, narrowly wing-margined often nearly to the base, at first densely villose, becoming glabrous in the autumn, from 8 to 10 millimetres in length; leaves on vigorous shoots thicker, very coarsely serrate, not lobed, from 7 to 8 centimetres long and from 6 to 7 centimetres wide, with stout broad-winged petioles and narrow acuminate falcate glandular stipules. Flowers from 1.4 to 1.5 centimetres in diameter, on long slender pedicels, in wide lax mostly from fifteen to twenty-flowered hairy corymbs, with narrow-lanceolate to linear acuminate glandular bracts and bractlets fading brown and often persistent until the flowers open, the lower peduncle from the axil of an upper leaf; calyx-tube narrowly obconic, thickly coated like the pedicels with long glistening white hairs, the lobes long, slender, acuminate, nearly glabrous on the outer surface, villose on the inner surface, reflexed after anthesis; stamens from ten to fifteen; anthers large, pale yellow; styles two or three, surrounded at the base by a narrow ring of pale hairs. Fruit on long slender stems, in wide many-fruited drooping clusters, short-oblong, full and rounded at the ends, yellowish red marked by large pale dots, from 9 to 10 millimetres in diameter; calyx little enlarged, with a deep narrow cavity, and spreading and often reflexed usually persistent lobes villose on the upper surface; flesh thin, dry, and hard; nutlets usually two, rounded and obtuse at the ends, rounded and slightly grooved or ridged on the back, with a low grooved ridge, from 6 to 7 millimetres long and from 4 to 4.5 millimetres wide.

A tree, from 5 to 7 metres high, with a tall trunk from 1 to 1.5 decimetres in diameter, and stout slightly zigzag branchlets covered when they first appear with matted white hairs, becoming verrucose, light chestnut-brown, rather lustrous and marked by large pale lenticels in their first season and light gray-brown the following year, and armed with numerous slender nearly straight bright chestnut-brown shining spines from 4 to 7 centimetres long. Flowers appear from the 10th to the middle of May. Fruit ripens early in October.

Borders of small streams in dry gravelly soil, near Monteer, Shannon County, Missouri, *B. F. Bush*, May 16, 1901 (Nos. 501 and 510), May 13 and October 5, 1905 (No. 9 B type), also May and October, 1905 (Nos. 9, 9 A, 9 D, 9 E, 9 F, 9 H, 9 I, 9 K, 9 L).

Of the species of Punctatæ previously described only *Cratægus Lettermani*, Sargent, has ten stamens with yellow anthers, and that central Missouri species differs from *Cratægus incædua* in its more obovate often deeply lobed scabrate leaves hoary-tomentose below while young, in its fewer-flowered more compact corymbs, and in its ovate or subglobose fruits on short pubescent peduncles.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CII. Cratægus incædua.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, inner face, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit showing the nutlets, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, ventral view, enlarged.
8. A nutlet, dorsal view, enlarged.

1

2

3

4

5

6

7

8

C. E. Faxon del.

CRATÆGUS INCÆDUA, Sarg.

CRATÆGUS LUDOVICIENSIS, SARG.

(Virides.)

CRATÆGUS LUDOVICIENSIS, *n. sp.*

Glabrous with the exception of a few caducous hairs on the upper surface of the midribs of the young leaves and petioles, and on the very young branchlets. Leaves obovate, rounded and short-pointed or acute at the apex, gradually narrowed and concave-cuneate at the entire base, finely, often doubly serrate above, with straight or incurved glandular teeth, and rarely slightly lobed above the middle; more than half grown when the flowers open and then very thin, light yellow-green, nearly glabrous and very smooth above and pale bluish green below, and at maturity thin, yellow-green and lustrous on the upper surface, pale on the lower surface, from 5 to 8 centimetres long and from 3.5 to 6 centimetres wide, with thin yellow midribs and primary veins; petioles slender, wing-margined at the apex, occasionally glandular early in the season, from 1.5 to 1.8 centimetres in length. Flowers from 1.5 to 1.6 centimetres in diameter, on long slender pedicels, in wide lax mostly ten to fifteen-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes long, very slender, acuminate, entire or occasionally minutely dentate near the middle, reflexed after anthesis; stamens fifteen; anthers yellow; styles three or four, usually four. Fruit on long slender stems, in wide many-fruited spreading clusters, short-oblong, full and rounded at the ends, crimson, pruinose, from 1 to 1.2 centimetres in length and from 9 to 10 millimetres in diameter; calyx little enlarged, with a deep narrow cavity, and spreading often incurved persistent lobes; flesh thin, yellow, dry, and mealy; nutlets usually four, slightly narrowed and rounded at the ends, ridged on the back, with a high grooved ridge, from 6 to 6.5 millimetres long and about 4 millimetres wide.

A tree, from 7 to 8 metres high, with a trunk sometimes 1 decimetre in diameter, covered with dark scaly bark, small spreading branches forming an open head, and slender nearly straight branchlets dark orange color and marked by pale lenticels when they first appear, becoming light chestnut-brown and lustrous in their first season and dull reddish brown the following year, and unarmed or furnished with occasional slender straight purplish shining spines 2.5 to 4 centimetres long. Flowers appear during the first week of May. Fruit ripens late in September or in October, often remaining on the branches until the middle of November. The leaves turn bright orange color late in the autumn before falling.

Bottom-lands of the Despères River, Carondelet, South St. Louis, Missouri, *J. H. Kellogg*, May 6, September 23, and November 19, 1902, May 7, 1903, May 3, 1905 (No. 7 type).

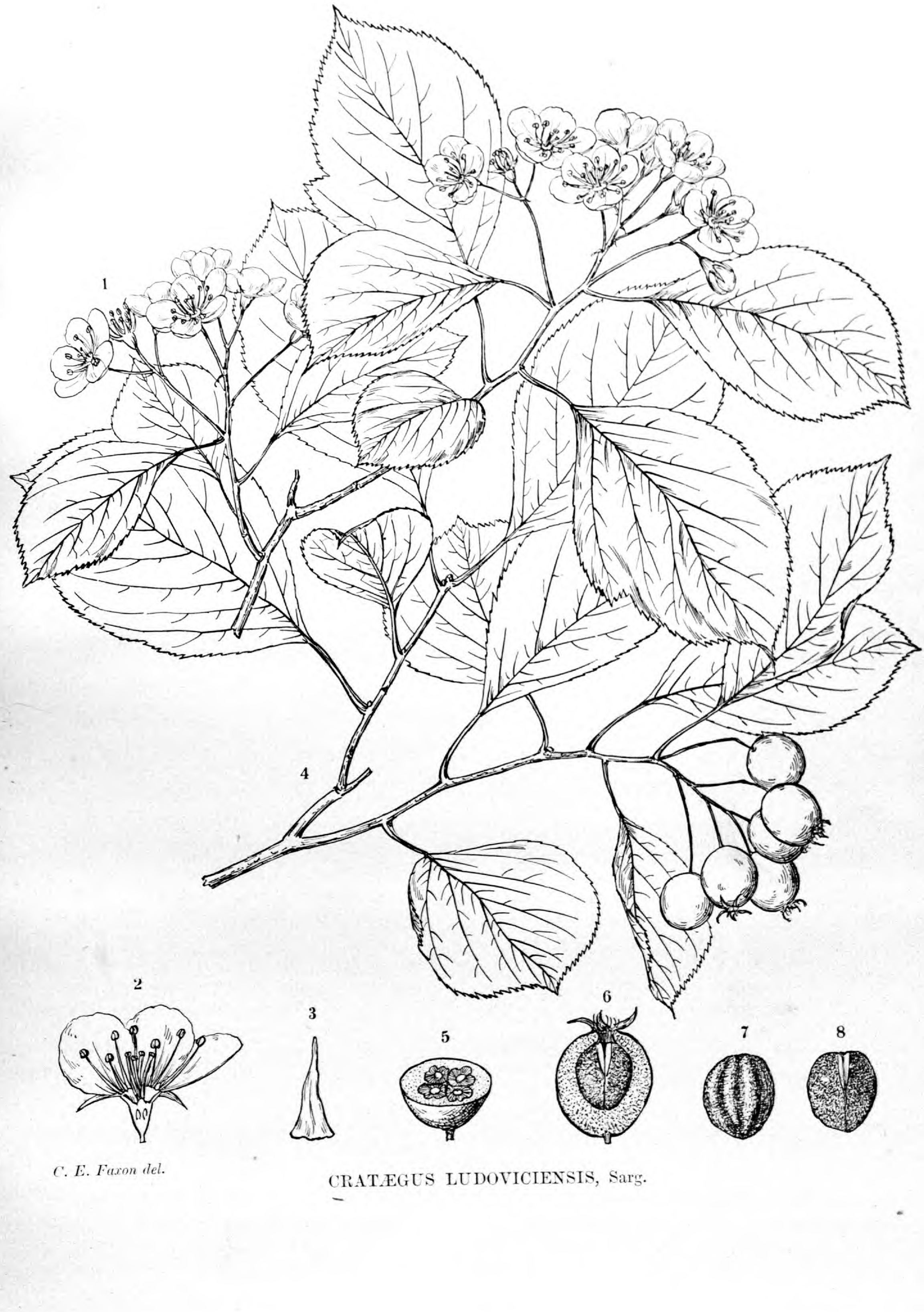
This is one of the large-fruited Virides species of which *Cratægus nitida*, Sargent, of the same region may be considered the type. Of the described species of this small group it is most nearly related to *Cratægus mitis*, Sargent, of the bottom-lands of the Mississippi River in Illinois below East St. Louis. It differs from that species in its much thinner leaves, which are never rhombic, in its much more slender and usually entire calyx-lobes, fewer stamens, and smaller fruits.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CIII. Cratægus Ludoviciensis.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, inner face, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. Vertical section of a fruit showing the nutlets, enlarged.
7. A nutlet, dorsal view, enlarged.
8. A nutlet, ventral view, enlarged.



C. E. Faxon del.

CRATÆGUS LUDOVICIENSIS, Sarg.

CRATÆGUS RUBICUNDULA, SARG.

(Pruinosæ.)

CRATÆGUS RUBICUNDULA, *n. sp.*

Glabrous with the exception of a few hairs on the upper surface of the young leaves. Leaves broadly ovate, acuminate, rounded, truncate, subcordate or abruptly cuneate at the entire base, coarsely doubly serrate above, with straight glandular teeth, and divided into four or five pairs of broad acuminate lateral lobes; slightly tinged with red when they unfold, not more than one third grown when the flowers open and then membranaceous, yellow-green, and nearly glabrous, and at maturity very thin, dark blue-green and smooth on the upper surface, pale on the lower surface, from 6 to 8 centimetres long and usually as broad or broader than long; petioles slender, slightly wing-margined and glandular at the apex, from 3.5 to 6 centimetres in length; stipules linear, glandular-serrate, fading brown, often persistent until the flowers open. Flowers from 2 to 2.5 centimetres in diameter, on slender pedicels, in compact two to seven usually four or five-flowered corymbs, with narrow obovate to linear glandular bracts and bractlets, the lowest peduncle from the axil of an upper leaf; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, acuminate, minutely glandular-dentate, reflexed after anthesis; stamens twenty; anthers pink; styles five, surrounded at the base by a narrow ring of long white hairs. Fruit on long pendulous stems, in two or three-fruited clusters, subglobose but usually rather broader than high, green, pruinose, finally becoming tinged with red, marked by large pale dots, from 1.3 to 1.4 centimetres in diameter; calyx without a tube, with a deep wide cavity, and spreading and appressed often deciduous lobes; flesh thick, yellow-green, dry, and mealy; nutlets five, thin, narrowed and acute at the ends, slightly ridged or rounded and grooved on the back, from 6.5 to 7 millimetres long and from 4.5 to 5 millimetres wide.

A shrub, from 2 to 3 metres high, with small stems spreading into thickets, and slender nearly straight branchlets light red-brown when they first appear, becoming chestnut-brown and lustrous in their first season and dull red-brown the following year, and armed with very numerous slender straight or slightly curved purple shining spines from 3 to 6 centimetres long. Flowers appear during the first week of May. Fruit ripens the end of October.

Bottom-lands of the Despères River in oak woods at Carondelet, South St. Louis, Missouri, *H. Eggert*, October 12, 1886, *J. H. Kellogg*, November 19, 1902, May 7, 1903 (No. 9 type).

This shrubby species is well distinguished by its very broad large leaves, and by its large fruit broader than high and larger than that of any of the described species of this group.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CIV. Cratægus rubicundula.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, inner surface, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. Vertical section of a fruit showing the nutlets.
7. A nutlet, ventral view, enlarged.
8. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS RUBICUNDULA, Sarg.

CRATÆGUS NEO-BUSHII, SARG.

(Intricatæ.)

CRATÆGUS NEO-BUSHII, *n. sp.*

Glabrous with the exception of a few hairs on the upper surface of the young leaves and petioles. Leaves ovate to rhombic, acuminate, concave-cuneate and gradually narrowed to the glandular base, sharply doubly serrate above, with straight or incurved glandular teeth, and slightly divided usually only above the middle into three or four pairs of broad acuminate lobes; when they unfold tinged with red and furnished with a few soft caducous white hairs on the upper side of the midribs and veins; more than half grown when the flowers open and then very thin, light yellow-green, and nearly glabrous, and at maturity thin, dark yellow-green, smooth and rather lustrous on the upper surface, pale on the lower surface, from 5.6 to 7 centimetres long and from 4.5 to 5 centimetres wide, with thin yellow midribs and primary veins; petioles slender, wing-margined at the apex, soon glabrous, glandular, with minute persistent glands, often rose-colored toward the base in the autumn, from 1.5 to 2.5 centimetres in length; leaves on vigorous shoots broadly ovate, usually cordate or occasionally truncate at the base, coarsely serrate, deeply and occasionally almost three-lobed by narrow sinuses reaching nearly to the midribs, often from 7 to 8 centimetres long and from 6 to 7 centimetres wide, with broad-winged petioles and foliaceous lunate coarsely serrate deciduous stipules. Flowers from 1.7 to 1.8 centimetres in diameter, on long slender pedicels, in wide usually four or five-flowered corymbs, with obovate to linear glandular-hispid bracts and bractlets fading rose color and often persistent until after the flowers open, the lowest peduncle from the axil of an upper leaf; calyx-tube narrowly obconic, the lobes broad, abruptly narrowed and long-pointed at the entire apex, laciniately glandular-serrate below the middle, reflexed after anthesis; stamens ten; anthers rose color; styles two or three, surrounded at the base by a ring of yellow hairs. Fruit on long erect stems, in wide mostly two or three-fruited clusters, short-oblong to subglobose, orange-red, marked by numerous dark dots, from 1 to 1.2 centimetres in diameter; calyx prominent, with a deep wide cavity, and spreading coarsely serrate persistent lobes; flesh thin, yellow-green, hard, and dry; nutlets two or three, obtuse, or when three narrowed at the rounded ends, ridged on the back, with a broad deeply grooved ridge, from 7 to 8 millimetres long and from 4 to 4.5 millimetres wide.

A shrub, from 1.5 to 2 metres high, with slender nearly straight branchlets, dark orange-red and marked by pale lenticels when they first appear, becoming chestnut-brown or purple and lustrous in their first season and dull reddish brown the following year, and unarmed or armed, with occasional short slender spines. Flowers appear from the 10th to the 15th of May. Fruit ripens the middle of October.

Dry gravelly soil near Monteer, Shannon County, Missouri, *B. F. Bush*, May 25, 1900 (No. 386), May 15 and October 2, 1905 (No. 10 A and 10 B type), May 14 and October 6, 1905 (No. 10), also October, 1905 (Nos. 10 D and 10 E).

This plant is named for its discoverer, Mr. B. F. Bush, and is interesting as the only species of the Intricatæ group that has been found west of the Mississippi River. This very natural group is composed of a number of small shrubs chiefly confined to the northern states, where they occur from southern Michigan to Massachusetts, and southward to eastern Pennsylvania, and along the Alleghany Mountains to northern Georgia and Alabama, where a few species are sometimes small trees.

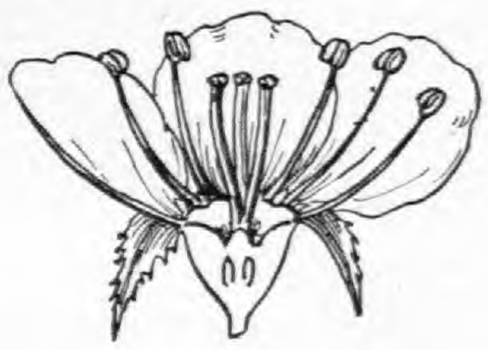
Cratægus Neo-Bushii most resembles *Cratægus rubella*, Beadle, a small shrub of the elevated region of northern Alabama, eastern Tennessee, and western North Carolina, but differs from it in its subglobose, not obovate, fruits on much longer pedicels, and in its less sharply toothed leaves.

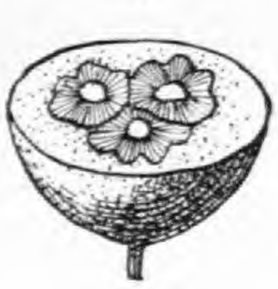
C. S. S.

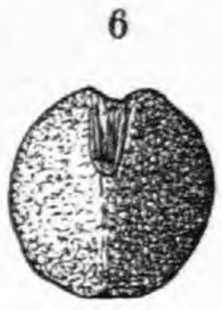
EXPLANATION OF THE PLATE.

PLATE CV. CRATÆGUS NEO-BUSHII.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, upper surface, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.
8. End of a vigorous shoot, natural size.







C. E. Faxon del.

CRATÆGUS NEO-BUSHII, Sarg.

CRATÆGUS TRIANTHOPHORA, SARG.

(Unifloræ.)

US TRIANTHOPHORA, *n. sp.*

/es oblong-obovate, rounded or acute at the apex, gradually narrowed to the cuneate base, barsely serrate above the middle, with spreading or slightly incurved glandular teeth; more half grown when the flowers open and then thin, yellow-green, very lustrous and coated with short soft white hairs, and paler and villose below, especially on the midribs and veins, at maturity thin, dark yellow-green, lustrous and scabrate on the upper surface, pale bluish en and still villose on the lower surface, from 2.5 to 4 centimetres long and from 1.5 to 2 timetres wide, with stout midribs, and very slender primary veins extending obliquely to the points of the lobes; petioles slender, wing-margined to below the middle, tomentose early in the season, becoming pubescent or nearly glabrous, from 4 to 5 millimetres in length. Flowers from 1.4 to 1.6 centimetres in diameter, on stout hoary-tomentose pedicels, in two or usually three-flowered tomentose mostly simple corymbs, with lanceolate to linear glandular caducous bracts and bractlets; calyx-tube narrowly obconic, covered with pale hairs most abundant toward the base, the lobes foliaceous, long, acuminate, laciniately glandular-serrate, villose, reflexed after anthesis; stamens twenty; anthers pale yellow; styles three or four. Fruit generally solitary, on erect pubescent reddish stems, obovate, full and rounded at the apex, abruptly narrowed at the base, light orange-red, very lustrous, marked by large pale dots, from 1.2 to 1.4 centimetres long and from 1 to 1.2 centimetres in diameter; calyx prominent, with a wide deep cavity, and much enlarged spreading and appressed coarsely serrate villose persistent lobes; flesh thick, yellow, dry, and mealy; nutlets three or four, acute at the ends, rounded and slightly grooved on the back, from 6.5 to 7.5 millimetres long and from 4.5 to 5 millimetres wide.

A shrub, from 6 to 12 decimetres high, with numerous stems, and very slender nearly straight branchlets thickly clothed with hoary tomentum when they first appear, becoming dark reddish brown, pubescent, verrucose and marked by small dark lenticels in their first season and light reddish brown the following year, and armed with very numerous thin straight purplish spines from 3 to 4 centimetres long. Flowers appear about the 10th of May. Fruit ripens the middle of October.

Dry open woods near Grandin, Shannon County, Missouri, *C. S. Sargent*, September 30, 1900 (No. 4), *B. F. Bush*, May 7 and October 12, 1905 (No. 12 type), May 8 and October 11, 1905 (Nos. 12 A and 12 B); along gravelly benches, Pleasant Grove, Shannon County, Missouri, *B. F. Bush*, August 12, 1899 (Nos. 463 and 465), May 20, 1900 (No. 349).

This species belongs to a small group of low shrubs which is chiefly confined to the Atlantic states from New York to Florida, a few of the species appearing also in northern Alabama. In the region west of the Mississippi River the described Unifloræ have been represented only by a single plant found near Dallas, Texas, by Mr. J. Reverchon (Nos. 26 and 34), May 28, 1901, without flowers. This has been referred to *Cratægus uniflora*, Moench, but I suspect that it is the same as this southern Missouri species. This differs from *Cratægus uniflora* in its obovate orange-red fruits, and in its usually three-flowered corymbs, the flowers of *Cratægus uniflora* being generally solitary or occasionally in pairs. *Cratægus trianthophora* is more closely related to *Cratægus gregalis*, Beadle, of the elevated regions of western North Carolina, but this species differs from the Missouri plant in its smooth usually narrower leaves, in its fewer-flowered hoary-tomentose corymbs, narrow-obovate yellowish fruits, and in its stouter branches and spines.[1]

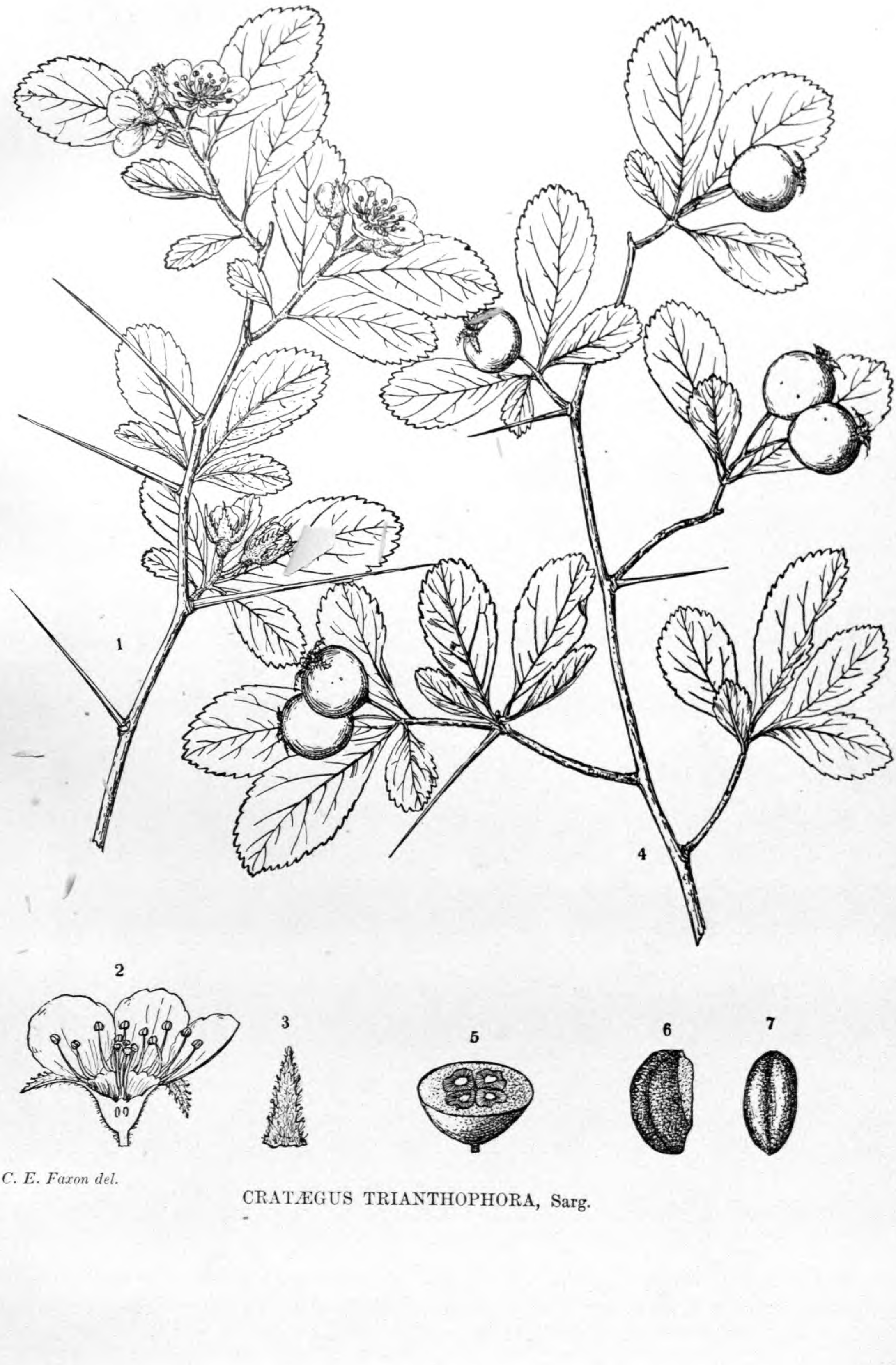
C. S. S.

[1] A specimen in the Gray Herbarium collected by Fendler at Camden, Arkansas, in 1850, with flowers and immature fruits, looks a good deal like this Missouri plant, but the flowers are solitary.

EXPLANATION OF THE PLATE.

PLATE CVI. CRATÆGUS TRIANTHOPHORA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, lower surface, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, side view, enlarged.
7. A nutlet, dorsal view, enlarged.



C. E. Faxon del.

CRATÆGUS TRIANTHOPHORA, Sarg.

CRATÆGUS MOLLICULA, *n. sp.*

(Tomentosæ.)

CRATÆGUS MOLLICULA, *n. sp.*

Leaves ovate to oval or obovate, acuminate, abruptly or gradually narrowed to the concave-cuneate glandular base, sharply often doubly serrate above, with straight glandular teeth, and slightly divided above the middle into two or three pairs of broad acuminate lobes; nearly fully grown when the flowers open the middle of May and then thin, yellow-green, lustrous and slightly hairy above, especially along the midribs, and villose below, and at maturity thin but firm in texture, yellow-green, nearly glabrous on the upper surface, paler and villose on the lower surface, from 6 to 8 centimetres long and from 4 to 5 centimetres wide, with thick yellow midribs and slender primary veins; petioles stout, slightly wing-margined at the apex, densely villose early in the season, becoming pubescent, occasionally glandular, from 1 to 1.5 centimetres in length; leaves on vigorous shoots rather thicker, ovate to oval, often from 9 to 10 centimetres long and from 6 to 7 centimetres wide. Flowers from 1.8 to 2 centimetres in diameter, on long stout densely villose pedicels, in wide mostly fifteen to twenty-flowered corymbs, the long stout villose lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with matted pale hairs, the lobes foliaceous, acuminate, laciniately glandular-serrate, villose on the outer surface below the middle, glabrous above, villose on the inner surface, reflexed after anthesis; stamens ten; anthers light yellow; styles two or three, surrounded at the base by a narrow ring of pale hairs. Fruit ripening early in October, on long straight hairy red stems in many-fruited clusters, subglobose to short-oblong, bright orange-red, lustrous, marked by large pale dots, from 1 to 1.2 centimetres in diameter; calyx little enlarged, with a deep shallow cavity, and small spreading lobes often deciduous from the ripe fruit; flesh thick, orange color, sweet, and succulent; nutlets two or three, full and rounded at the ends, or when three narrowed at the apex, ridged on the back, with a broad grooved ridge, penetrated on the inner faces by broad shallow cavities, from 5 to 5.5 millimetres long and from 4 to 4.5 millimetres wide.

A shrub, from 2 to 3 metres high, with numerous stems, and stout branchlets light orange-green and covered with long white hairs when they first appear, becoming light red-brown and puberulous in their first season and glabrous and gray slightly tinged with red the following year, and unarmed or armed, with occasional slender straight ashy gray spines.

Rocky banks of streams near Monteer, Shannon County, Missouri, *B. F. Bush*, May 14 and October 6, 1905 (No. 8 type), May 14, 1905 (No. 8 A), May and October, 1905 (No. 8 B with only five anthers).

This species belongs to that section of the great group of Tomentosæ with thin leaves pale-pubescent below at maturity, of which *Cratægus tomentosa*, Linnæus, is the type. It is distinguished from the other described species of this section by its ten stamens;[1] and of the thin-leaved Tomentosæ only *Cratægus Missouriensis*, Ashe, of the same region produces its flowers in such few-flowered corymbs.

C. S. S.

[1] In the *Manual of the Trees of North America*, *Cratægus Chapmani*, Ashe, is described with ten stamens. This is evidently a mistake, for the species is described by Beadle as having twenty stamens; and his specimens from the trees on the bank of the Swananoa River at Biltmore, North Carolina, certainly have from eighteen to twenty stamens. A specimen of a species of this group, however, collected by Boynton at Silver Creek, Floyd County, Georgia, May 9, 1899, and sent to the Arnold Arboretum from Biltmore, has distinctly ten stamens. Unfortunately no fruit of this plant has been collected.

EXPLANATION OF THE PLATE.

PLATE CVII. CRATÆGUS MOLLICULA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, lower surface, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, dorsal view, enlarged.
7. A nutlet, ventral view, enlarged.

C. E. Faxon del.

CRATÆGUS MOLLICULA, Sarg.

ALVARADOA, LIEBM.

ALVARADOA, Liebmann, *Vidensk. Meddel. Kjöben.* v. 100 (*Nov. Pl. Mexic. Gen.*) (1853). — Walpers, *Ann.* iv. 382. — Bentham, *Pl. Hartweg.* 343. — Grisebach, *Abhandl. k. Gesell. Wiss. Göttingen*, ix. 41 (*Erläut. Pfl. Trop. Am.*). — Bentham & Hooker, *Gen.* i. 411. — Baillon, *Hist. Pl.* v. 411. — Radlkofer, *Sitz. Math.-Phys. Bayer. Acad. Wiss.* xx. 138. — Engler, *Engler & Prantl Pflanzenfam.* iii. pt. iv. 229.

Trees or shrubs, with bitter juices and slender terete pubescent branchlets. Leaves alternate, crowded at the end of the branches, unequally pinnate, long-petiolate, many-foliolulate, persistent; leaflets alternate, oblong, entire; stipules and stipels none. Flowers in many-flowered axillary or terminal racemes. Fruit a two or three-winged samara, three-celled below the middle, two-celled above, crowned with the remnants of the styles. Seed erect, compressed; testa membranaceous, albumen none; embryo oblong-compressed; cotyledons flat; radicle inferior, very short.

An anomalous genus, by several authors doubtfully referred to Sapindaceæ, but chiefly on account of its bitter properties Alvaradoa has been placed by Engler in Simarubaceæ. It consists of three species; of these *Alvaradoa amorphoides*, Liebmann, the type of the genus, is distributed from the Bahama Islands and southern Florida, through some of the Antilles to southern Mexico and Central America, and to Argentina.[1] The other species, *Alvaradoa Jamaicensis*,[2] and *Alvaradoa arborescens*,[3] appear to be confined to the islands of Jamaica and of Cuba.

C. S. S.

[1] Ex Grisebach.

[2] Bentham, *Pl. Hartweg.* 344 (1857). — Grisebach, *Fl. Brit. W. Ind.* 141. — Walpers, *Ann.* vii. 638. — Radlkofer, *Sitz. Math.-Phys. Bayer. Acad. Wiss.* xx. 147.

The leaflets of *Alvaradoa Jamaicensis* are often emarginate, with strongly revolute margins and prominent midribs, and are light yellow-green and glabrous on the lower surface. The fruit is three-winged, ovate, pointed at the ends, glabrous and bright scarlet when ripe. *Alvaradoa Jamaicensis*, which grows on the mountains of Jamaica, is described as a shrub or slender tree up to 8 metres high. The branches are only slightly pubescent.

[3] Wright ex Grisebach, *Cat. Pl. Cuba*, 50 (1866). — Radlkofer, *Sitz. Math.-Phys. Bayer. Acad. Wiss.* xx. 147.

The leaflets of *Alvaradoa arborescens* are oval, rounded or acute at the apex, distinctly revolute on the margins, and quite glabrous. The fruit is two-winged, oblong, rounded at the ends and slightly emarginate at the apex, on short pubescent peduncles. The branches are only slightly pubescent (Wright, No. 2190 in Herb. Gray). *Alvaradoa arborescens* is described by Wright as a small tree up to 10 metres high. I have not seen the flowers of this little known tree or of *Alvaradoa Jamaicensis*, and a description of the flowers is not included, therefore, in this account of the genus.

ALVARADOA AMORPHOIDES, LIEBM.

ALVARADOA AMORPHOIDES, Liebmann, *Vidensk. Meddel. Kjöben.* v. 101 (*Nov. Pl. Mexic. Gen.*) (1853). — Walpers, *Ann.* iv. 382; vii. 638. — Grisebach, *Fl. Brit. W. Ind.* 141; *Cat. Pl. Cub.* 50. — Hemsley, *Bot. Biol. Am. Cent.* i. 215. — Grisebach, *Abhandl. k. Gesell. Wiss. Göttingen*, xxiv. 77 (*Symbol. Fl. Argentin.*). — Watson, *Proc. Am. Acad. Sci.* xxi. 423. — Radlkofer, *Sitz. Math.-Phys. Bayer. Acad. Wiss.* xx. 146.

ALVARADOA MEXICANA, Liebmann ex Bentham, *Pl. Hartweg.* 344 (1856). — Walpers, *Ann.* vii. 638. — Hemsley, *Bot. Biol. Am. Cent.* i. 215.

PICRAMIA ? FILIPETALA, Turczaninow, *Bull. Mosc.* xxxi. 446 (1858).

Leaves from 1 to 3 decimetres long; leaflets twenty-one to forty-one, obtuse or occasionally minutely mucronate at the apex, gradually narrowed below into short slender pubescent petiolules, slightly thickened and revolute on the margins, dark green on the upper surface, pale and glaucous-pubescent on the lower surface, from 1 to 2 centimetres in length, and from 7 to 11 millimetres wide, with slender midribs and very obscure primary veins. Inflorescence from 8 to 12 centimetres long, the pistillate accrescent, becoming at maturity from 1 to 2 decimetres in length. Flowers regular, minute, diœcious, on slender accrescent pubescent pedicels, from the axils of minute ovate deciduous bracts, in many-flowered axillary or terminal hoary-tomentose racemes; calyx campanulate, five-parted, the lobes ovate, acute, hoary-tomentose on the outer surface, slightly imbricated in æstivation; disk five-lobed. Staminate flowers appearing sessile in the bud, their pedicels only slightly accrescent after anthesis; petals five, filiform, shorter than the calyx-lobes; stamens five; filaments slender, elongated, slightly villous toward the base, longer than the calyx-lobes, inserted between the lobes of the disk and alternate with the calyx-lobes; anthers introrse, two-celled, united except at the apex, opening longitudinally by marginal slits; connective conspicuous, orbicular; pistillate flowers on short accrescent pedicels; petals none, or very rarely present; stamens none; ovary compressed, unequally three-angled, villous, hirsute on the margins, three-celled at least at the base, apparently two-celled above, two of the cells small, compressed, and empty, the other larger, with two anatropous ovules; styles two, subulate or recurved, sometimes of unequal length, stigmatic above the middle, persistent and accrescent on the fruit. Fruit lanceolate, acuminate, narrowly two-winged, pubescent, ciliate on the margins, with long spreading crowded hairs, slightly tinged with red, from 1 to 1.5 centimetres in length and about as long as the slender hairy pedicels; seeds oval, acute at the ends, pale yellow, 6 millimetres long.

A shrub or slender tree, in Florida occasionally 10 metres high, with a trunk from 1.5 to 2.5 decimetres in diameter, and hoary-pubescent branchlets marked by the large obovate obcordate leaf-scars of fallen leaves, rounded at the narrow base and showing the ends of three conspicuous equidistant fibro-vascular bundles.[1]

Florida, Timb's Hummock, near Gossman Station, Dade County, *J. A. Eaton*, December 22, 1903 (Nos. 708 and 718);[2] Bahama Islands, near Nassau, *John L. & Alice R. Northrop* (No. 145), A. H. Curtiss (No. 105); Cuba, *C. Wright*, No. 2189 (in Herb. Gray); Mexico, Colema,

[1] The first description of *Alvaradoa amorphoides* is in Bentham's *Plantæ Hartwegianæ*, published in 1859, where on page 12 it appears as "*Mimosearum ?* gen. nov. ? — Habitus Amorphæ."

[2] *Alvaradoa amorphoides* is said to have been collected again in Dade County, Florida, and on Long Key in 1904 (see *Bull N. Y. Bot. Gard.* iii. 424).

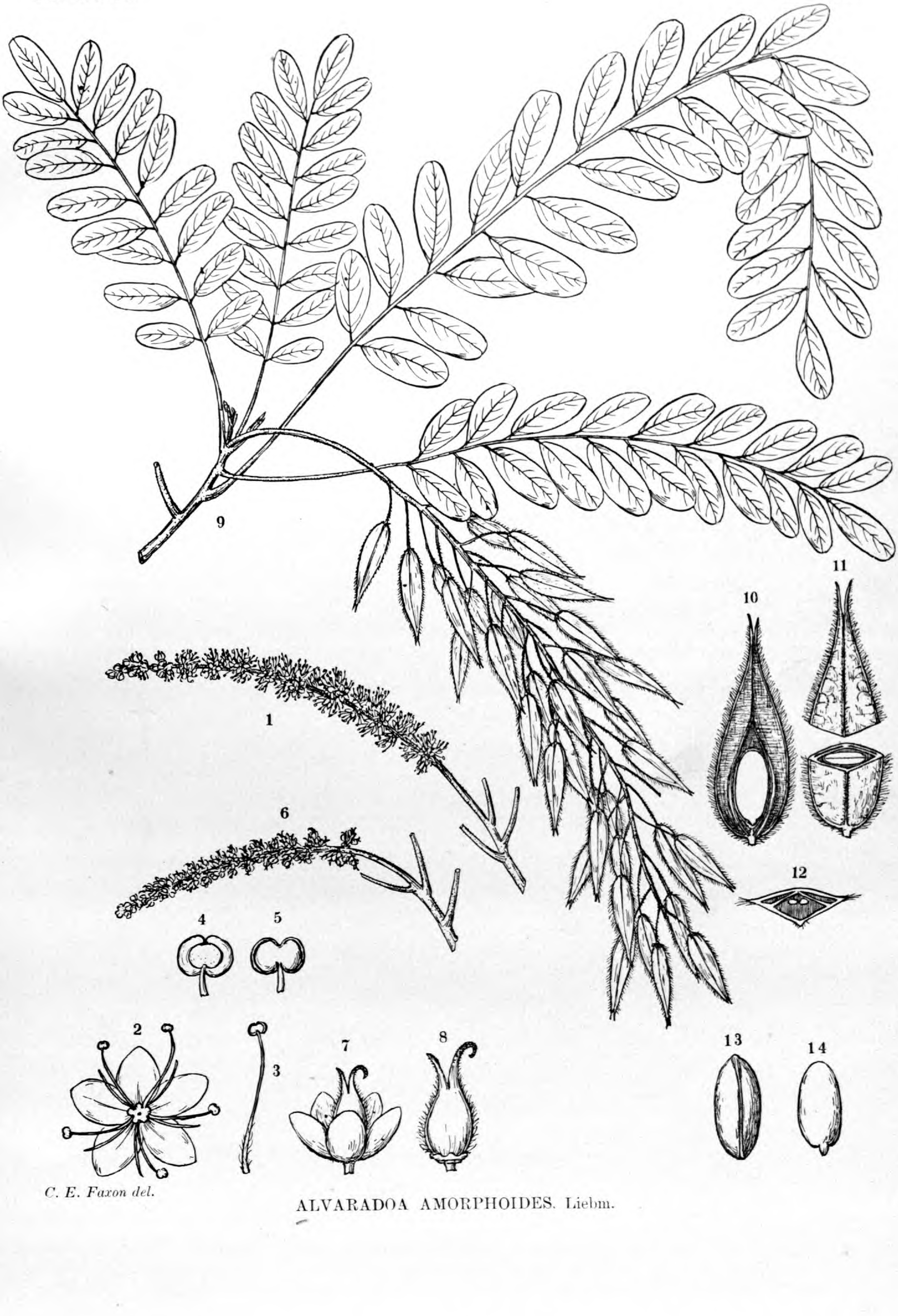
E. Palmer (No. 1245), Barranca, near Guadalajara, *C. G. Pringle* (Nos. 2940 and 4740), mountains above Iguala, State of Guerrero, *C. G. Pringle* (No. 8421), State of Oaxaca, *E. W. Nelson* (No. 2365 in Herb. Gray); Yucatan, *C. F. Millspaugh*, No. 34 (in Herb. Gray), *P. Valdez*, No. 100 (in Herb. Gray); Guatemala, Chicacao, *Heyde & Lux*, No. 6416 (in Herb. Gray); Costa Rica, ex Herb. Pittier, No. 13778 (in Herb. Gray); Nicaragua, Chinandega, *C. F. Baker* (No. 2031).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CVIII. ALVARADOA AMORPHOIDES.

1. A staminate inflorescence, natural size (*Eaton*, No. 718).
2. A staminate flower, enlarged.
3. A stamen, enlarged.
4. An anther, rear view, enlarged.
5. An anther, front view, enlarged.
6. A pistillate inflorescence, natural size (*Pringle*, No. 2940).
7. A pistillate flower, enlarged.
8. A pistillate flower, the calyx removed, enlarged.
9. A fruiting branch, natural size (*Pringle*, No. 4740).
10. Vertical section of a fruit, enlarged.
11. A fruit laid open horizontally, enlarged.
12. Cross section of a young fruit, enlarged.
13. A seed, enlarged.
14. An embyro, enlarged.



C. E. Faxon del.

ALVARADOA AMORPHOIDES. Liebm.

BERBERIS DIAPHANA, MAXIM.

BERBERIS DIAPHANA, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxiii. 309 (*Flor. Tangut.* 32, t. 8, figs. 1–7) (1877); *Mél. Biol.* ix. 711. — Schneider, *Ill. Handb. Laubholzk.* i. 305, fig. 198 a–g; *Bull. Herb. Boiss.* sér. 2, v. 398.

BERBERIS YUNNANENSIS, Schneider, *Ill. Handb. Laubholzk.* i. 306, fig. 198 h–n (in part) (not Franchet) (1905).

Leaves deciduous, chartaceous, glabrous, short-petioled, obovate to oblong-obovate, rarely oval, obtuse and mucronate, gradually narrowed at the base into a short petiole, entire, or serrate, with remote spiny teeth pointed forward, dark bluish green above, glaucous, reticulate and papillose beneath, from 2 to 4 centimetres long and from 1 to 1.6 centimetres wide. Flowers bright yellow, 1 centimetre in diameter, solitary or oftener in twos or threes, rarely in four-flowered umbel-like racemes; peduncle up to 2 centimetres in length, sometimes very short; pedicels from 1.5 to 2.5 centimetres long, with a minute bract at the base, thickened at the apex; sepals six, elliptic, of almost equal length, from 7 to 8 millimetres long, obtuse; petals about 6 millimetres in length, oval, emarginate at the apex, with two oval obtuse nectaries; stamens slightly shorter than the sepals, the filaments about three times longer than the anthers; ovaries many-ovuled. Fruit oval, usually slightly attenuated and oblique at the apex, about 1 centimetre long, bright scarlet, somewhat pruinose, the stigma almost sessile; seeds from six to eight, narrow-oblong-obovate, about 6 millimetres in length, light brown, minutely punctulate.

A broad low shrub, in cultivation from 5 to 7.5 decimetres high, with rather stout furrowed erect branches, light yellowish brown in their first years later becoming grayish brown; spines about the color of the branches, usually three-parted in the cultivated plant, slender, from 0.5 to 1.5 centimetres long, in the type specimen stout and from 1 to 4 centimetres long. Flowers appear in May with the leaves. Fruit ripens in September. Later in the autumn the leaves change to a brilliant scarlet color.

China: Kansu, *N. M. Przewalski*, September 6, 1872 (Herb. St. Petersburg).

Berberis diaphana is most closely related to the Himalayan *Berberis macrosepala*, Hooker f. & Thomson, and to *Berberis Yunnanensis*, Franchet. The former is distinguished by its dark brown puberulous branchlets and curved usually solitary peduncles, and the latter by its entire thinner and smaller leaves scarcely reticulate beneath, and by the fascicled flowers. Schneider refers the cultivated plant figured here to *Berberis Yunnanensis*, of which I have not seen the type. I cannot, however, agree with this identification and refer it to *Berberis diaphana*. One of the type specimens in fruit of this species before me differs only in its more vigorous branches and stouter spines and the somewhat more attenuated fruits, while in the characteristic inflorescence, fruits, and foliage it agrees exactly with our cultivated plant.

This handsome Barberry was raised at the Arnold Arboretum from seeds received from Monsieur M. L. de Vilmorin in 1894, and the young plants began to flower for the first time in 1901. It has proved perfectly hardy in eastern Massachusetts, where it is certainly one of the most ornamental species of the genus, with its bright yellow flowers, conspicuous scarlet fruits, and the beautiful autumnal tints of the foliage.

ALFRED REHDER.

Arnold Arboretum.

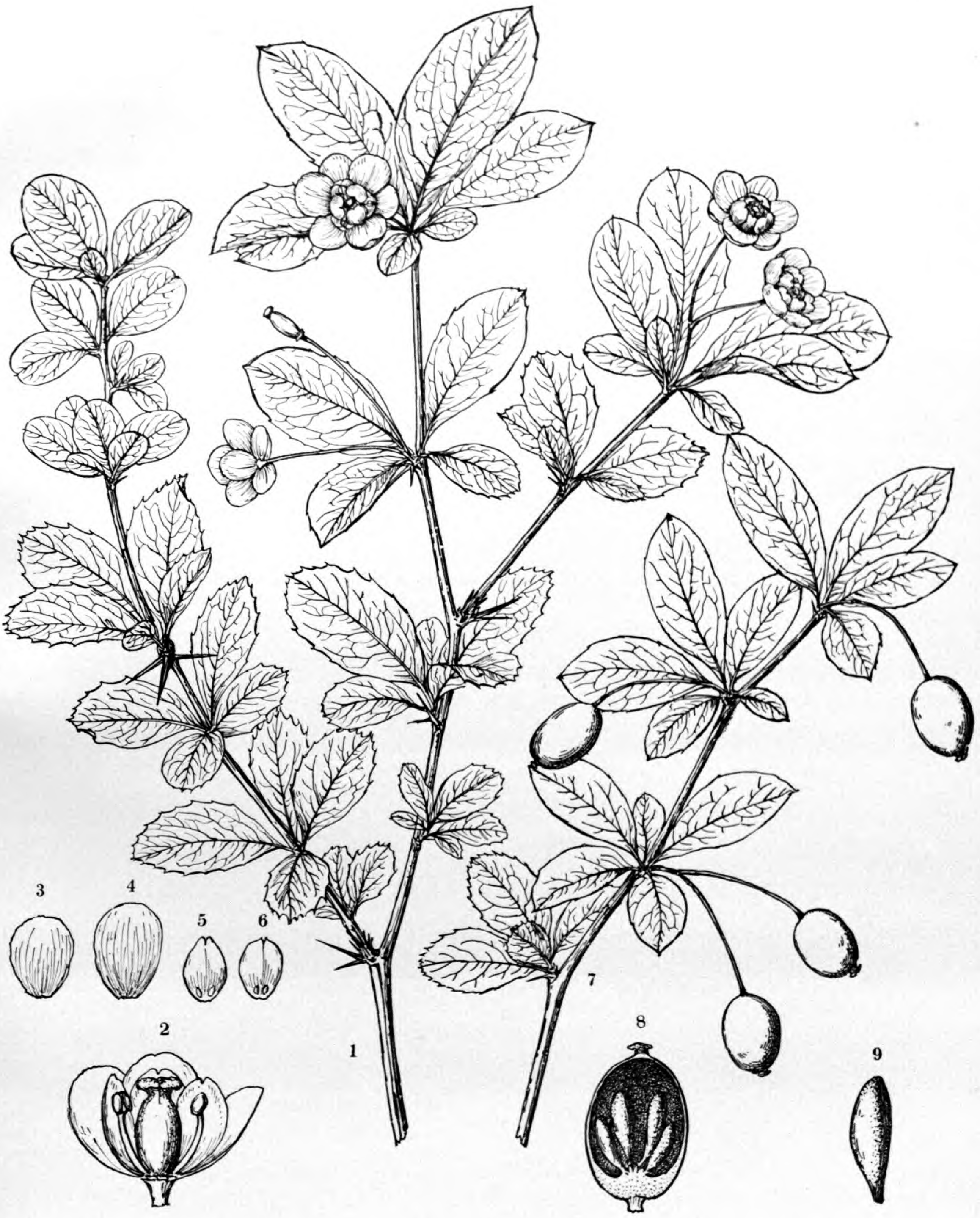
EXPLANATION OF THE PLATE.

PLATE CIX. BERBERIS DIAPHANA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. An outer sepal, enlarged.
4. An inner sepal, enlarged.

5 and 6. Petals, interior view, enlarged.

7. A fruiting branch, natural size.
8. Vertical section of a fruit, enlarged.
9. A seed, enlarged.



C. E. Faxon del.

BERBERIS DIAPHANA, Maxim.

BERBERIS BRETSCHNEIDERI, REHD.

BERBERIS BRETSCHNEIDERI, *n. sp.*

Leaves deciduous, chartaceous at maturity, obovate-oblong, obtuse, gradually narrowed at the base, densely and unequally, often nearly doubly setose-serrate, the teeth with long setæ pointed forward, light yellowish green on the upper surface, glaucescent on the lower surface, with prominent veins, stomatiferous only on the under side, not papillose, from 4 to 6 centimetres long and from 1.8 to 3 centimetres broad; petioles very short or up to 1 centimetre in length. Flowers pale yellow, about 7 millimetres in diameter, in pendent racemes from 3 to 4 centimetres long, on peduncles about 1 centimetre in length; pedicels slender, from 6 to 8 millimetres long, usually purple like the small ovate acute persistent bract at their base; outer sepals orbicular-ovate, tinged with purple, with two small ovate acute purple prophylla at the base of the flower, about half as long as the broadly ovate inner sepals; petals six, from 4 to 5 millimetres in length, as long as the inner sepals, broadly oval and emarginate at the apex, with purplish obovate nectaries obtuse at the apex; filaments filiform, longer than the anthers; ovaries oblong, purplish, with sessile capitate stigmas, and sessile ovules. Fruit in pendent purple racemes, oblong, often slightly pyriform, about 1 centimetre in length, purplish and slightly pruinose, the stigma sessile; seeds usually two, oblong, narrowed toward the base, 7 millimetres long, brown, finely reticulate.

An upright shrub, attaining in cultivation the height of from 2 to 3 metres, with dark red-brown terete one-year-old branches, later becoming gray, and producing prominent floriferous spurs; spines usually simple, small, light brown, about 1 centimetre long. Flowers appear in May. Fruit ripens in September. Late in the autumn the leaves change to handsome shades of orange and scarlet.

North China: Seeds collected in the mountains near Pekin were received at the Arnold Arboretum from Dr. E. Bretschneider in 1880.[1]

Berberis Bretschneideri is closely related to *Berberis Amurensis*, Ruprecht, but is chiefly distinguished from that species by its terete reddish brown branches, the less prominent reticulate veinlets on the lower surface of the leaves, and its more spreading habit. No wild specimens from north China referable to this species have been seen, but there is a Japanese specimen in the herbarium of the Arnold Arboretum collected on the shores of Lake Umoto in Japan, September 6, 1892, by C. S. Sargent, which is closely allied to this species, differing from it only in its narrower more acute leaves.

Berberis Bretschneideri has proved perfectly hardy in the Arnold Arboretum and is a vigorous fast-growing shrub which is particularly ornamental in autumn, when its foliage assumes a brilliant color. The pale flowers, however, which are produced rather sparingly, and the fruits are less attractive than those of most other Barberries.

ALFRED REHDER.

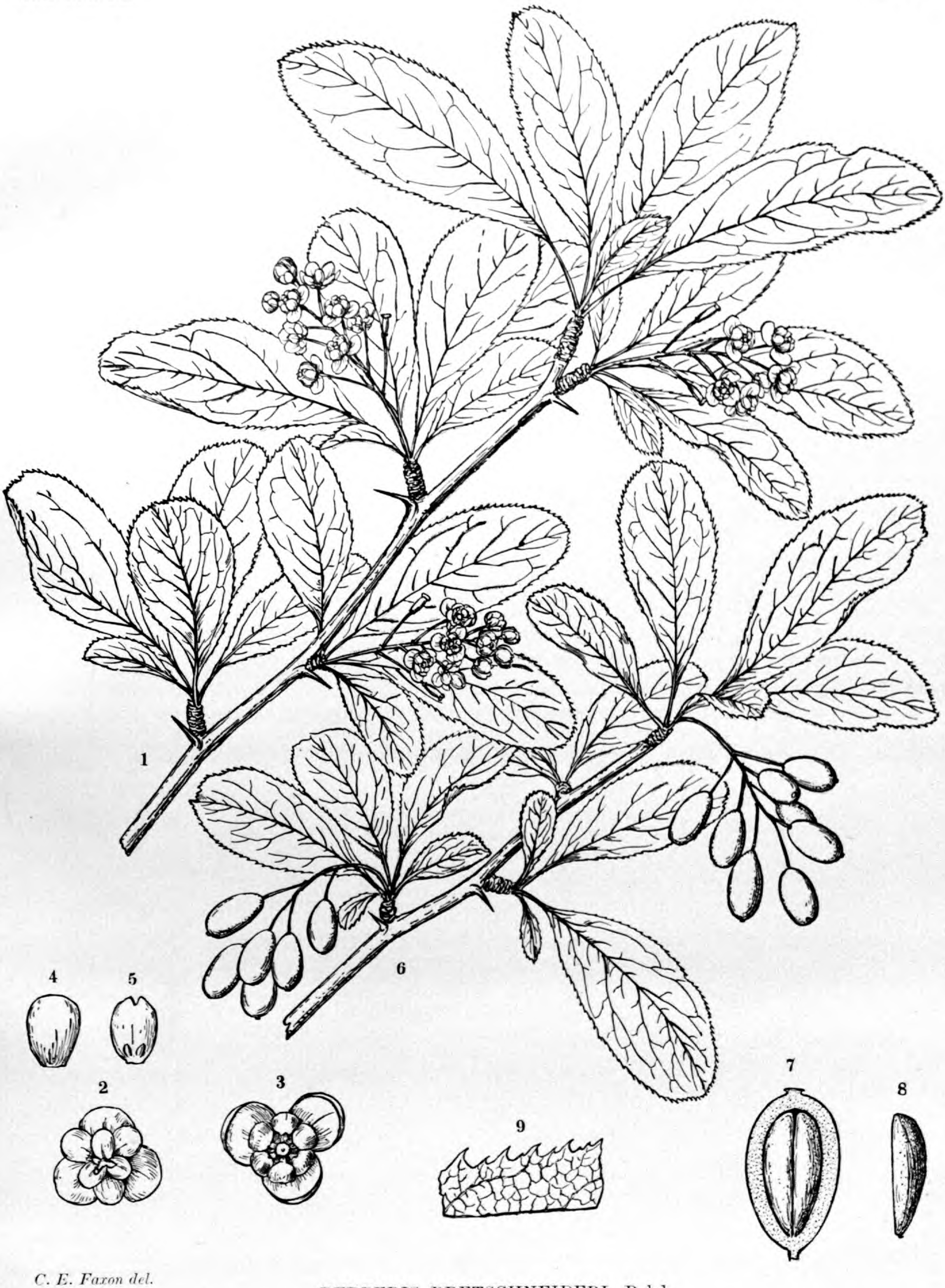
Arnold Arboretum.

[1] From one of these cultivated plants this description and plate have been made.

EXPLANATION OF THE PLATE.

Plate CX. Berberis Bretschneideri.

1. A flowering branch, natural size.
2. A flower, seen from below, enlarged.
3. A flower, seen from above, enlarged.
4. A sepal, enlarged.
5. A petal, interior view, enlarged.
6. A fruiting branch, natural size.
7. Vertical section of a fruit, enlarged.
8. A seed, enlarged.
9. Margin of a leaf, enlarged.



C. E. Faxon del.

BERBERIS BRETSCHNEIDERI, Rehd.

MALUS DAWSONIANA, REHD.

(Malus fusca × communis.)

MALUS DAWSONIANA, *hybr. nov.*

Leaves oval to ovate, short-acuminate, rounded or broadly cuneate at the base, coarsely and unequally or almost doubly crenate-serrate, coated with thin cobwebby tomentum when unfolding, glabrous at maturity, dark yellowish green above, paler green beneath, from 5 to 9 centimetres long and from 3 to 6 centimetres broad; petioles slender, glabrous, from 1.5 to 2.5 centimetres in length. Inflorescence five to seven-flowered; pedicels from 2 to 2.5 centimetres long, slightly villous; calyx-tube villous outside, the lobes triangular-lanceolate, densely villous on the inner surface; petals oblong-ovate or oblong-obovate, 1.7 millimetres long, white, slightly villous at the base; stamens numerous, about half as long as the petals; styles five or often four, slightly shorter than the longest stamens, connate at the base, glabrous; ovary five or often four-celled. Fruit elliptic-oblong or obovate-oblong, slightly impressed at the base, crowned at the rounded apex by the remnants of the small calyx, yellow or greenish yellow, usually with a red cheek, from 2.5 to 3 centimetres long and from 1.8 to 2 centimetres thick, slightly acid, and when ripe soon becoming pulpy; seeds oblong-obovate, 8 millimetres in length, light brown.

A tree, with ascending or spreading branches, slightly pubescent during their first year, becoming purplish brown and glabrous in their second season, with reddish brown bark broken into thin scaly plates easily separable. Winter-buds ovate, reddish brown, lustrous, from 3 to 4 millimetres long, grayish pubescent at the apex. Flowers appear in May with the leaves. Fruit ripens about the middle of October.

There can be little doubt that *Malus Dawsoniana* is the offspring of a cross-fertilization of the Crab-apple of northwestern America, *Malus fusca*, O. K. Schneider, by a cultivated or naturalized Apple-tree, *Malus communis*, Poiret. It was raised at the Arnold Arboretum from seed collected by C. G. Pringle in Oregon in 1881. Of these seedlings three are still growing in the Arboretum; two of these are shrubby trees now about 5 metres high and represent the true *Malus fusca*, while the third plant has grown into a tree of about 7 metres in height, with a short trunk 26 centimetres in diameter, and is the plant here described. In habit and in its scaly dark reddish brown bark it resembles *Malus fusca*, but the leaves rarely show any tendency to become lobed and are generally broader and more oval, with a more crenate serration. The flowers are almost twice as large as those of *Malus fusca*, and the fruits, though preserving the shape of those of *Malus fusca*, are about twice as large, with a persistent calyx, and with four or more often five locules. The inflorescence is more like that of *Malus communis*, but the pedicels are as slender as those of *Malus fusca*. It is probable that an orchard of Apple-trees or an Apple-tree escaped from cultivation existed in the neighborhood of the wild Crab from which Mr. Pringle collected the seeds. There would be nothing remarkable in such a hybrid, for all the species of Malus show a decided tendency to natural hybridization. This plant is named in honor of Mr. Jackson Dawson, the superintendent of the Arnold Arboretum, by whom it was raised.

As an ornamental tree *Malus Dawsoniana* has little to recommend it; there are many other more beautiful forms of the genus Malus, and the fruit apparently possesses no particular quality which would make this hybrid a desirable starting-point from which to breed a new race of apples. It is, however, interesting as the first hybrid known of *Malus fusca*.

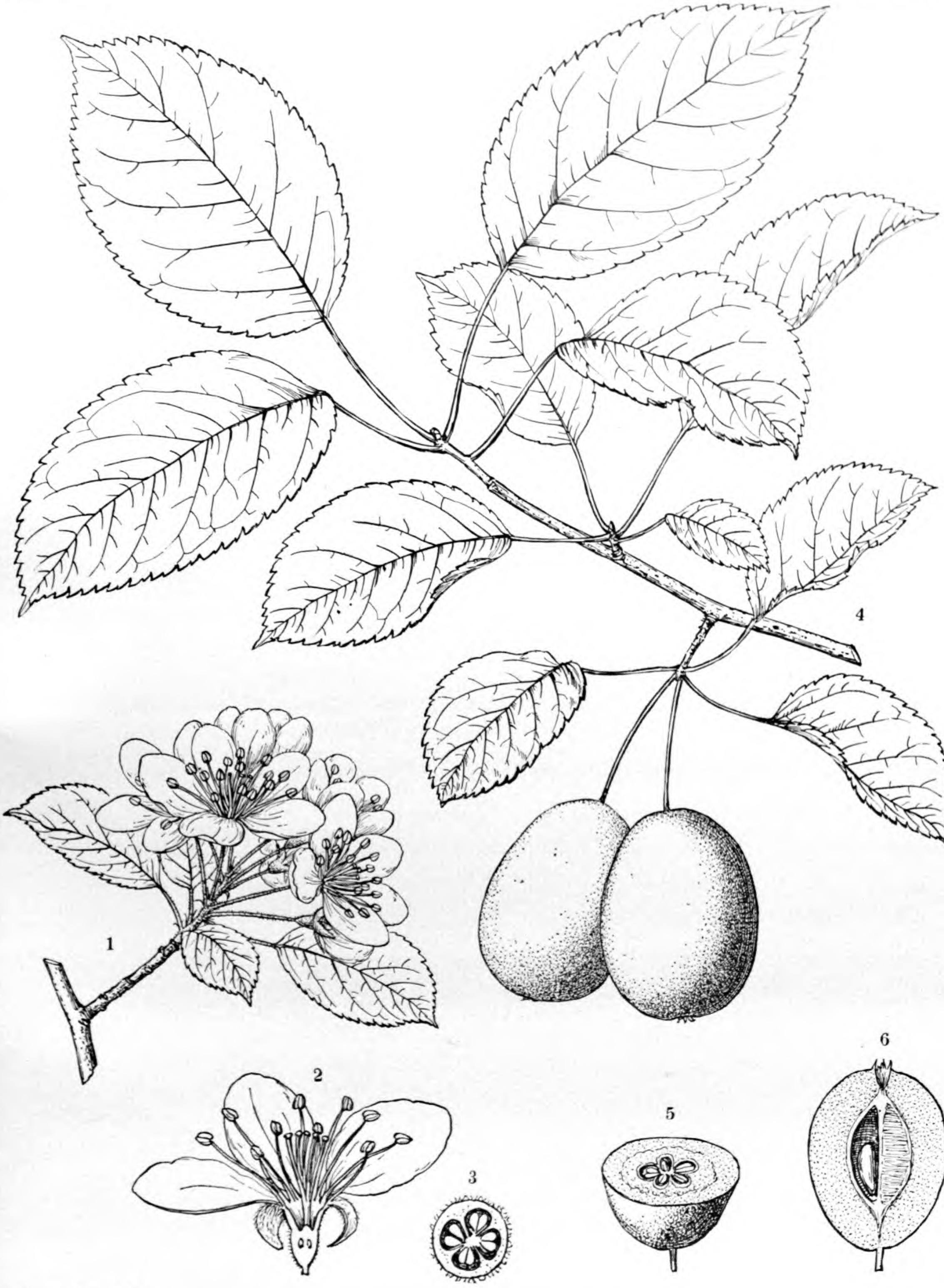
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate CXI. Malus Dawsoniana.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. Cross section of an ovary, enlarged,
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. Vertical section of a fruit, enlarged.



C. E. Faxon del.

MALUS DAWSONIANA, Rehd.

ACER SUTCHUENSE, FRANCH.

ACER SUTCHUENSE, Franchet, *Jour. de Bot.* viii. 294 (1894). — Bois, *Jour. Soc. Nat. Hort. France*, sér. 4, i. 199. — Pax, *Engler Pflanzenreich*, Heft 8 (iv. 163), 29. — J. H. Veitch, *Jour. Roy. Hort. Soc.* xxix. 353, f. 96. — Rehder, *Sargent Trees and Shrubs*, i. 181. — Schneider, *Ill. Handb. Laubholz.* ii. 212, fig. 140 p–q.

Leaves deciduous, trifoliate, their petioles slender, from 3 to 7 centimetres long, grooved, glabrous with the exception of a tuft of yellowish hairs at the articulation of the petiolules; leaflets elliptic-oblong to oblong-lanceolate, acuminate, from 5 to 8 centimetres long and from 1.8 to 3.2 centimetres wide, unequally and obtusely dentate, glabrous and dull green above, glaucescent and sparingly villous beneath, reticulate at maturity, with eight to ten veins, the terminal leaflet broadly cuneate at the base, with a petiolule from 5 to 8 millimetres in length, the lateral leaflets obliquely rounded at the base, with much shorter petiolules. Inflorescence a dense many-flowered corymbiform raceme on a leafy or rarely leafless branch, usually simple but occasionally with three-flowered ramifications at the base, glabrous, 3.5 centimetres broad and about 2 centimetres high, on a peduncle from 8 to 16 millimetres long; pedicels from 8 to 12 millimetres in length, with a short ovate bract at the base; flowers andro-diœcious, 5-merous, yellowish; the staminate with oval sepals 6 millimetres long and oblong petals of about the same length; stamens ten, nearly twice as long as the petals, inserted on the disk; rudimentary ovary small, pilose; hermaphrodite flowers not yet known. Fruits apparently upright, in short glabrous racemes; wings curved upwards and parallel, light purplish or brownish, with the nutlet from 1.8 to 2 centimetres in length; nutlets from 7 to 8 millimetres long and 6 millimetres broad, strongly convex and inconspicuously veined, light brown, with thick woody walls.

A tree, sometimes 6 metres high, with glabrous branchlets marked by numerous lenticels, purplish brown at the end of their first year, later becoming light grayish brown. Winter-buds ovate, obtusish, from 4 to 6 millimetres long, with four or six pairs of outer ovate acute scales, lustrous brown, and glabrous with the exception of the yellowish hairs on the margins.

China: East Szech'uan, *R. P. Farges* (No. 955 ex Franchet); Western Hupeh, *E. H. Wilson* (No. 639), S. Wushan, *E. H. Wilson* (No. 1931).

Acer Sutchuense is most nearly related to *Acer Mandshuricum*, Maximowicz, but differs from that species chiefly in its many-flowered inflorescence, in the shorter pedicels, and in the exserted stamens; in winter it may be easily distinguished by its shorter ovate and obtusish winter-buds, which in *Acer Mandshuricum* are ovate-lanceolate and sharply pointed. A peculiarity of *Acer Sutchuense* rarely seen in other species is the occasional suppression of one of the leaves of the pair below the inflorescence, which is borne on branchlets furnished with two or with one pair of leaves, but sometimes on leafless branchlets. The description of the previously unknown fruits has been drawn from Wilson's No. 1931.[1]

ALFRED REHDER.

Arnold Arboretum.

[1] As the recent collections of Wilson and others have added to the knowledge of Asiatic Maples and their distribution, some supplementary notes to species previously treated in this work (see i. 151–182) are added here.

ACER LÆTUM, C. A. Meyer, see p. 177. Western China: *E. H. Wilson* (No. 3357).

ACER LÆTUM, var. TOMENTOSULUM, Rehder, see p. 178. Western China: *E. H. Wilson* (No. 3353).

ACER LONGPIPES, Rehder, see p. 178.

Leaves at maturity velvety pubescent beneath, their petioles much enlarged at the base, embracing the lower part of the winter-buds and furnished with a ligula-like protraction. Fruits in a loose and large corymb; wings with the nutlets from 3 to

3.5 centimetres long, spreading at acute or at nearly right angles, slightly curved, light purplish brown; nutlets from 1 to 1.2 centimetres in length, flattened, slightly veined, light yellowish brown ; cotyledons conduplicate, accumbent.

China: Hupeh, S. Wushan, *E. H. Wilson* (No. 1808).

ACER LONGIPES, var. TIENTAIENSE, Schneider, *Ill. Handb. Laubholzk.* ii. 224, fig. 153 d–e (1907).

Differs from the type in the leaves being glabrous on the under surface except tufts of hair in the axils of the veins.

China : Chekiang, Tien-tai Mountains (*Faber*, No. 202 b ex Schneider).

ACER PUBINERVE, *sp. nov.*

Leaves orbicular-ovate in outline, subcordate, with an open sinus, about 12 centimetres long and 14 centimetres broad, deeply five-lobed, dark green and glabrous above with the exception of the short villous pubescence on the nerves, lighter green and nearly glabrous beneath except a short and dense villous pubescence on the nerves and primary veins; lobes oblong-ovate, caudate, appressed-serrate, with short acuminate teeth, usually entire toward the base, the middle lobe from 4 to 6 centimetres in length and rather longer than the lateral lobes, the basal lobes only from 1 to 1.5 centimetres long; sinuses acute, reaching more than half-way to the middle; petioles slender, velutinous, from 4 to 5 centimetres in length. Inflorescence a glabrous panicle, ovate-oblong in outline, and without the slender from 2 to 3.5 centimetres long peduncle, from 3 to 6 centimetres in length; pedicels slender, from 2 to 6 millimetres long; flowers polygamous, 5-merous; sepals oblong, obtusish, purplish, about 2 millimetres long; petals slightly shorter, white, ovate, usually with a few coarse teeth at the apex; disk extrastaminal, glabrous; stamens eight, in the staminate flowers about as long as the sepals; anthers oval-oblong, purplish; pistil rudimentary, pilose; in the pistillate flower, stamens shorter than sepals, with broadly oval anthers; ovary densely pilose; style 1.5 millimetres long, pilose toward the base, bifid at the apex. Fruits not seen.

A tree; young branchlets glabrous, greenish or purplish, becoming purplish brown or olive green, lustrous, without or with occasional small lenticels. Winter-buds apparently with few scales.

China: Chekiang, Tien-tai Mountains at an altitude of 650 metres, 1889, *E. Faber* (No. 203 in Herb. Kew).

Acer pubinerve is closely related to *Acer Campbelli*, Hooker f. & Thomson, but is easily distinguished from that species by its five-lobed leaves and their pubescent veins, and by the glabrous disk of the flower.

ACER ROBUSTUM, Pax, see p. 179; add as synonym *Acer flabellatum*, Rehder, see p. 161, t. 81, and transfer the species from section 3, Spicata, to the place of *Acer flabellatum*.

As Pax described the inflorescence of *Acer robustum* as a corymb, I could not identify Wilson's and Henry's specimens, which have a distinctly paniculate inflorescence, with his *Acer robustum*, and therefore considered that they represented an undescribed species. Since the publication, however, of *Acer flabellatum* I have had the opportunity to examine Giraldi's Chinese collection at Florence, and find that *Acer robustum* collected by him in Shensi is identical with my *Acer flabellatum*.

ACER OLIVERIANUM, Pax, see p. 179. Western China, *E. H. Wilson* (No. 3353 a).

ACER SINENSE, Pax, see p. 155, t. 78. Western China, *E. H. Wilson* (No. 3345); Yunnan, "Szemeo mts. 5000 ft. tree 20′," *A. Henry* (No. 12044).

Henry's specimen from Yunnan agrees in foliage with the variety *concolor*, but has larger fruits, with wings spreading at an acute angle, and the wing with the nutlet is 3.6 centimetres long.

ACER CAUDATUM, var. MULTISERRATUM (Maximowicz), Rehder, see p. 163. Shensi, *Giraldi* (Nos. 2137, 2138, 2139, 2142, 2143).

ACER CAUDATUM, var. PRATTII, Rehder, see p. 164. Western China, *E. H. Wilson* (Nos. 3347, 3347 b).

ACER CAUDATUM, var. UKURUNDUENSE, Rehder, see p. 164. China: Shensi, *Giraldi* (Nos. 2130, 2131, 2133, 2134, 2146, 7139); also add as synonym *Acer lasiocarpum*, Léveillé & Vant, *Bull. Soc. Bot. France*, liii. 591 (1906), according to Faurie's Nos. 6100, 6101, 6102 from Japan (in Herb. Arnold Arboretum).

ACER ERIANTHUM, Schwerin, see p. 159. Shensi, *Giraldi* (Nos. 2111, 2117, 2144).

ACER OBLONGUM, var. CONCOLOR, Pax, see p. 180. Yunnan, *Henry* (No. 10957).

ACER LÆVIGATUM, Wallich, see p. 180. Western China, *E. H. Wilson* (No. 3346).

ACER DAVIDI, Franchet, see p. 167. Shensi, *Giraldi* (Nos. 1440, 2108, 2109, 2122, 2125–29, 2135, 2145, 3793); Chekiang, Tien-tai Mountains, 1890, *Faber* (No. 201 in Herb. Kew).

ACER LAXIFLORUM, Pax, see p. 180. Western China, *E. H. Wilson* (Nos. 3349, 3349 a).

ACER TSCHONOSKII, Maximowicz, see p. 33. Add as a synonym *Acer pellucidobracteatum*, Léveillé & Vant, *Bull. Soc. Bot. France*, liii. 592 (1906), according to Faurie's No. 6729 from Japan (in Herb. Arnold Arboretum).

ACER TETRAMERUM, Pax, see 181. Western China, *E. H. Wilson* (No. 3348).

ACER TETRAMERUM, var. LOBULATUM, Rehder ex J. H. Veitch, *Jour. Roy. Hort. Soc.* xxix. 353, figs. 94, 97 (*nom. seminud.*) (1905). — Rehder, *Fedde Rep. Nov. Spec.* i. 174.

Acer tetramerum, Rehder, *Sargent Trees and Shrubs*, i. 171, t. 85, in part as to figure 1 a.

This variety is distinguished from the type by the incisely lobed leaves, sparingly pubescent or glabrescent beneath, usually with two lateral incisely-dentate lobes and sometimes with two very small basal lobes.

I may add here that another supposedly new Japanese species collected in a garden at Sapporo, and described by Léveillé & Vant as *Acer Fauriei* in *Bull. Soc. Bot. France*, liii. 590 (1906), turns out, according to the type specimen, Faurie's No. 6084 (in Herb. Arnold Arboretum), to be the American *Acer Negundo*, L.

EXPLANATION OF THE PLATE.

PLATE CXII. ACER SUTCHUENSE.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A fruiting branch, natural size (*Wilson*, No. 1931).
4. A samara, enlarged.
5. Winter-buds, enlarged.

C. E. Faxon del.

ACER SUTCHUENSE, Franch.

RHODODENDRON KAEMPFERI, PLANCH.

RHODODENDRON KAEMPFERI, Planchon, *Flore des Serr.* ix. 77 (1853).
RHODODENDRON SIEBOLDI, Miquel, *Ann. Mus. Lugd.-Bat.* i. 33, excl. var. (1863).
RHODODENERON INDICUM, var. KAEMPFERI, Maximowicz, *Mém. Acad. Sci. St. Pétersbourg,* sér. 7, xii. 38 (1866).
AZALEA INDICA, var. KAEMPFERI, Rehder, *Bailey Cycl. Am. Hort.* i. 122 (1900); *Möller's Deutsch. Gärtn.-Zeit.* xvii. 417, figs.

Leaves deciduous, or a few small ones below the flower buds persistent until spring, membranaceous, elliptic or broadly elliptic, sometimes nearly rhombic or occasionally elliptic-ovate, acute at the ends, mucronate at the apex, with a minute callous mucro, ciliate, bright green above, paler green beneath, setose on both surfaces, with appressed rufous hairs most abundant on the midribs and veins and on the petioles, from 3 to 6 centimetres long and from 1 to 2.5 centimetres broad; petioles 2 millimetres in length. Flowers appearing with or shortly before the leaves, in two to four-flowered umbels, from terminal buds; corolla rotate-campanulate, bright orange-red to pink, from 4 to 5 centimetres in diameter; lobes oval, obtuse, about 2 centimetres long, longer than the tube; calyx-lobes persistent, oval to oblong-ovate or oblong-obovate, obtuse, rufously setose outside, long-ciliate, nearly glabrous on the inside, about 5 millimetres in length; pedicels densely rufously setose, from 4 to 7 millimetres long; stamens five, slightly shorter than the lobes of the corolla or nearly as long; anthers yellow, oval; style exserted, purple, ovary rufously setose. Capsule conic-ovoid, narrowed toward the truncate apex, surrounded at the base by the persistent calyx, rufously hirsute, 1.2 centimetres long, splitting at maturity nearly to the base into five valves separating from the placentiferous columella; seeds 1 millimetre long, irregularly ovoid, brown.

A slender loosely branched shrub, sometimes 3 to 4 metres high, but usually lower, with forked or indistinctly whorled branches, and densely rufously setose branchlets, becoming gray or grayish brown, their bark finally peeling off in thin threads. Winter-buds terminal, ovate, from 5 to 8 millimetres long, consisting of two to four scales, rufously setose and of almost equal length, supported at the base by several small leaves persisting during the winter. Flowers appearing at the Arnold Arboretum about the middle of May, and on the high mountains of Japan in June and July. Capsules ripen in September.

Japan: on the mountains of Hokkaido and Hondo; Hokkaido: Sapporo, Prov. Ishakari, May 8, 1895, Chilose, Prov. Iburi, June 12, 1889, Hakodate Yama, July 29, 1888, Prov. Hidaka, *Y. Tokubuchi,* Samani Sando, Prov. Hidaka, June 19, 1884, *K. Miyabe;* Hondo: shores of Lake Chuzenzi, November 3, 1892, and Miyanoshito, August 24, 1892, *C. S. Sargent,* Shinano, above Narai, September 3, 1905, *J. G. Jack;* Kiushiu, Kokusa, April 20, 1903, *U. Faurie.*

Rhododendron Kaempferi has usually been regarded as a variety of the Chinese *Rhododendron Indicum,* but as it possesses several apparently constant characters, which distinguish it from the different forms of that species, and as it is geographically well separated, it is better to treat it as a distinct species, as was proposed by Planchon in 1853. It seems most closely related to *Rhododendron Simsii,* Planchon (*Azalea Indica,* Sims, not Linnæus), of southwestern China, which differs in its persistent lanceolate leaves, lanceolate calyx-lobes, and ten stamens, with purple anthers. The typical *Rhododendron Indicum* (*Azalea Indica,* Linnæus, *Azalea macrantha,* Bunge, *Rhododendron Breynii,* Planchon) is easily distinguished by its persistent generally obovate and obtuse leaves, lustrous above, by its larger,

usually solitary flowers, and by the purple anthers of the five to ten stamens. There are, however, some forms that have generally been referred to *Rhododendron Indicum* which are most closely related to *Rhododendron Kaempferi* and can be referred to this species as varieties; these are: —

Rhododendron Kaempferi, var. *Japonicum*, n. comb. (*Rhododendron Indicum*, ϵ *amœnum*, a *Japonicum*, Maximowicz, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xvi. No. 9, 41). This plant differs from the type of *Rhododendron Kaempferi* in its smaller leaves, scarcely more than 1.5 centimetres long, and in its smaller rosy purple flowers. It is a low much-branched shrub.

Japan: Kiu-siu, volcano Wunzen, Prov. Simabara, *Maximowicz*. The specimens from this locality were mixed, according to Maximowicz, with individuals closely resembling the type of *Rhododendron Kaempferi*, but the one specimen from Maximowicz in the Gray Herbarium represents the type of this variety.

Rhododendron Kaempferi, var. *amœnum*, n. comb. (*Azalea amœna*, Lindley, *Paxton Flow. Gard.* iii. t. 89. — *Rhododendron amœnum*, Planchon, *Fl. des Serres*, ix. 80. — *Rhododendron Indicum*, *e amœnum*, Maximowicz, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xvi. No. 9, 40. — *Azalea Indica*, var. *amœna*, Rehder, *Bailey Cycl. Am. Hort.* i. 122). This is a garden form with smaller often obtusish leaves, and smaller flowers, with a double corolla. It was found by Fortune in 1850 in the Azalea gardens near Shanghai and was sent by him to England.[1] It is now common in the gardens of the United States and Europe.

Although *Rhododendron Kaempferi* was figured and described by Kaempfer in 1712 in his *Amœnitates Exoticæ* (p. 846), it is one of the last of the plants related to *Rhodendron Indicum* introduced into cultivation, and it was not until 1892, when Professor Sargent brought seeds of it to the Arnold Arboretum from his journey in Japan, that this beautiful shrub became an inmate of American and European gardens. It has proved in New England the hardiest of all the species and varieties of this race and has not been hurt by the severe winters of eastern Massachusetts, although during unusually cold seasons the flower-buds are sometimes injured. For ten years this Rhododendron has flowered profusely almost every year in the Arboretum, especially the plants in a large group at the northern base of Hemlock Hill, where in May, when they are covered with rich orange-red and pink flowers, they make a brilliant and beautiful contrast with the dark background of the Hemlocks. A position like this, sheltered against the rays of the midday sun, suits this Rhododendron, as the flowers are liable to become discolored during warm and cloudless days. *Rhododendron Kaempferi* is certainly one of the most beautiful spring-flowering shrubs which are hardy in New England.

ALFRED REHDER.

Arnold Arboretum.

[1] See Fortune, *A Journey to the Tea Countries of China*, 329.

EXPLANATION OF THE PLATE.

PLATE CXIII. RHODODENDRON KAEMPFERI.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. An ovary, enlarged.
4. A fruiting branch, natural size.
5. A winter branch, natural size.

C. E. Faxon del.

RHODODENDRON KAEMPFERI, Planch.

VIBURNUM CINNAMOMIFOLIUM, REHD.

VIBURNUM CINNAMOMIFOLIUM, *n. sp.*

Leaves coriaceous, persistent, elliptic-oblong, long-acuminate, cuneate at the base, entire or with few small teeth toward the apex, conspicuously three-nerved, glabrous, dark yellowish green above, lighter green beneath, from 8 to 13 centimetres long, and from 3 to 4.5 centimetres broad; petioles rather stout, glabrous, from 1 to 2.5 centimetres in length. Corymbs umbel-like, large and loose, glabrous, from 12 to 17 centimetres in diameter, on peduncles from 2 to 3.5 centimetres long; rays six to eight; flowers on slender pedicels from 2 to 3 millimetres long on raylets of the third order; calyx-tube turbinate, the lobes minute, semiorbicular or triangular, about 0.5 millimetre in length; corolla greenish white, rotate, from 4 to 5 millimetres in diameter, the lobes broadly ovate, revolute, 1 millimetre long, nearly as long as the tube; stamens slightly longer than the lobes; anthers suborbicular, yellow. Drupe ovoid, crowned by the persistent style, bluish black, lustrous, about 4 millimetres high and 3 millimetres in diameter; pericarp scarcely fleshy; stone yellowish white, without grooves or ridges; seed with a reddish brown testa and deeply ruminate albumen.

A glabrous shrub or small tree, sometimes 6 metres high, with dark reddish brown branches covered with numerous conspicuous lenticels. Leaves apparently purple as they unfold.

Western China: Szech'uan, Mt. Omei, *E. H. Wilson* (No. 5022).

Viburnum cinnamomifolium is closely related to *Viburnum Davidi*, Franchet, from which it differs but little in its foliage, except that the leaves of the latter are thicker and distinctly wrinkled on the upper surface; but by its much smaller compact inflorescence, with the flowers on raylets of the second order, by the longer lanceolate-ovate calyx-lobes, the shorter stamens, with purple anthers, and by the larger fruits 4.5 millimetres in diameter *Viburnum Davidi* is easily distinguished from *Viburnum cinnamomifolium*.

As Mr. Wilson collected ripe seeds, this species is probably now in cultivation in the Veitchian nurseries at Combe Wood. On account of its handsome evergreen foliage it will certainly prove a valuable acquisition for the gardens of temperate regions.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate CXIV. Viburnum cinnamomifolium.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, natural size.
5. A fruit, enlarged.
6. A stone, enlarged.
7. Cross section of a stone, enlarged.

C. E. Faxon del.

VIBURNUM CINNAMOMIFOLIUM, Rehd.

VIBURNUM PROPINQUUM, HEMSL.

VIBURNUM PROPINQUUM, Hemsley, *Jour. Linn. Soc.* xxiii. 355 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 587.

Leaves coriaceous or chartaceous, persistent, elliptic to elliptic-oblong or ovate to ovate-lanceolate, acuminate, narrowed or rarely almost rounded at the base, remotely denticulate usually only above the middle, conspicuously three-nerved, glabrous, dark yellowish green above, paler green beneath, from 4 to 9 centimetres long and from 1.5 to 3.5 centimetres broad; petioles slender, from 6 to 15 millimetres in length. Corymbs umbel-like, terminal, glabrous, from 4 to 7 centimetres in diameter, on slender peduncles from 1.5 to 2.5 centimetres in length; rays usually seven; flowers small, on raylets of the second order, with slender pedicels; calyx-lobes broadly triangular-ovate, obtuse, about 0.5 millimetres long; corolla greenish white, rotate, about 4 millimetres in diameter, with long hairs inside at the base; the lobes broadly ovate, 1 millimetre in length, about as long as the tube; stamens as long as the corolla; anthers suborbicular, yellow; ovary turbinate. Drupe shining, bluish black, globose-ovoid, crowned by the persistent style, from 5 to 6 millimetres long and from 3.5 to 4 millimetres thick; stone yellowish white, smooth; seed with a brown finely reticulate testa and deeply ruminate albumen.

A shrub, with reddish brown lustrous branches marked by small lenticels. Winter-buds small, covered by two pointed scales. Leaves apparently purplish when unfolding.

Central and western China: Hupeh, *A. Henry* (Nos. 3415, 3415 A, 4313, 5221, 5225, 6658, 7745), *E. H. Wilson* (No. 382), Szech'uan, *E. H. Wilson* (No. 3727), Nanchuan, *von Rosthorn* (ex Gräbner).

Viburnum propinquum forms with *Viburnum cinnamomifolium*, Rehder, and *Viburnum Davidi*, Franchet, a rather distinct group of the section Tinus, well characterized by the three-nerved leaves. By this character it much resembles *Viburnum sempervirens*, K. Koch, which, however, differs widely in its fruit. *Viburnum propinquum* varies much in the shape, size, texture, and serration of its foliage. A small-leaved form is

VIBURNUM PROPINQUUM, var. PARVIFOLIUM, Gräbner, *Engler Bot. Jahrb.* xxix. 587 (1901).

Leaves ovate, acuminate, not exceeding 4 centimetres in length; fruits globose, 3 millimetres long, brown and lustrous.

Szech'uan, Nan-chuan, Ta-kuo-kou, von Rosthorn (ex Gräbner).

This species is now in cultivation at the Veitchian nurseries, where it was introduced through Wilson, who sent seeds collected in 1901.[1] Its chief ornamental value is found in the handsome evergreen foliage and the glossy bluish black fruits. The flowers, like those of *Viburnum cinnamomifolium*, are too small and too dull in color to rival those of most of the other species of the genus.

ALFRED REHDER.

Arnold Arboretum.

[1] *Hortus Veitchii*, 410 (1906).

EXPLANATION OF THE PLATE.

PLATE CXV. VIBURNUM PROPINQUUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, natural size.
5. A stone, enlarged.
6. Cross section of a stone, enlarged.

C. E. Faxon del.

VIBURNUM PROPINQUUM, Hemsl.

VIBURNUM, HENRYI, HEMSL.

VIBURNUM HENRYI, Hemsley, *Jour. Linn. Soc.* xxiii. 353 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 586.

Leaves oblong to obovate-oblong, subcoriaceous, acuminate or abruptly acuminate, cuneate at the base, serrulate, with teeth sometimes reduced to callous tips, glabrous, dark yellowish green above, light green beneath, from 6 to 10 centimetres long and from 2.5 to 4 centimetres wide, with five to seven pairs of veins curving and anastomosing before reaching the margins; petioles slender, glabrous, slightly winged, from 1.5 to 2.5 centimetres in length. Inflorescence a terminal panicle with usually opposite ramifications, from 6 to 9 centimetres long and from 7 to 10 centimetres broad, glabrous, on a slender glabrous peduncle from 2.5 to 3.5 centimetres in length, the ramifications bracteate at the base, with linear-lanceolate greenish white bracts; flowers white, 6 millimetres in diameter, on pedicels from 1 to 5 millimetres long; calyx-lobes triangular, acutish, about 1 millimetre in length; corolla rotate-campanulate, the lobes orbicular, about 2 millimetres long, equaling the tube; stamens as long as the corolla or slightly longer; anthers oval, yellowish white; style very short and thick, about as long as the calyx-lobes; stigma capitate. Fruiting panicle pendent; drupes compressed, apparently dark purple, elliptic; stone elliptic, light brownish yellow, 6 millimetres long and 4.5 millimetres broad, with two slight dorsal ribs, and a deep furrow and slight transversal ridges on the ventral side.

A shrub, sometimes trailing over rocks, or a small tree up to 5 metres high, with slender branches covered with grayish brown bark slightly divided by longitudinal fissures, and glabrous purplish or greenish branchlets, becoming purplish brown in their second year. Winter-buds small, ovate, about 4 millimetres long, with two outer scales covered with a yellowish tomentum.

China: Hupeh, *A. Henry* (Nos. 1705, 1730, 4060, 5784, 6092, 7466), *E. H. Wilson* (No. 1071); Szech'uan, S. Wushan, *A. Henry* (Nos. 5617, 7608), Nan-chuan, Mo-tzu-ai, *von Rosthorn* (No. 415 in Herb. Christiania),[1] Hon-chi-k'ou, *von Rosthorn* (No. 698 ex Gräbner); Yunnan, Feng-chen-lin, *A. Henry* (No. 10645).[2]

Viburnum Henryi is apparently a very handsome and graceful tree, with its large panicles of white flowers; in habit it is probably much like *Viburnum Sandankwa*, Hasskarl, which is sometimes to be seen in gardens, but is only hardy as far north as the Orange grows. *Viburnum Henryi* is probably a hardier plant, and its introduction into gardens is desirable.

ALFRED REHDER.

Arnold Arboretum.

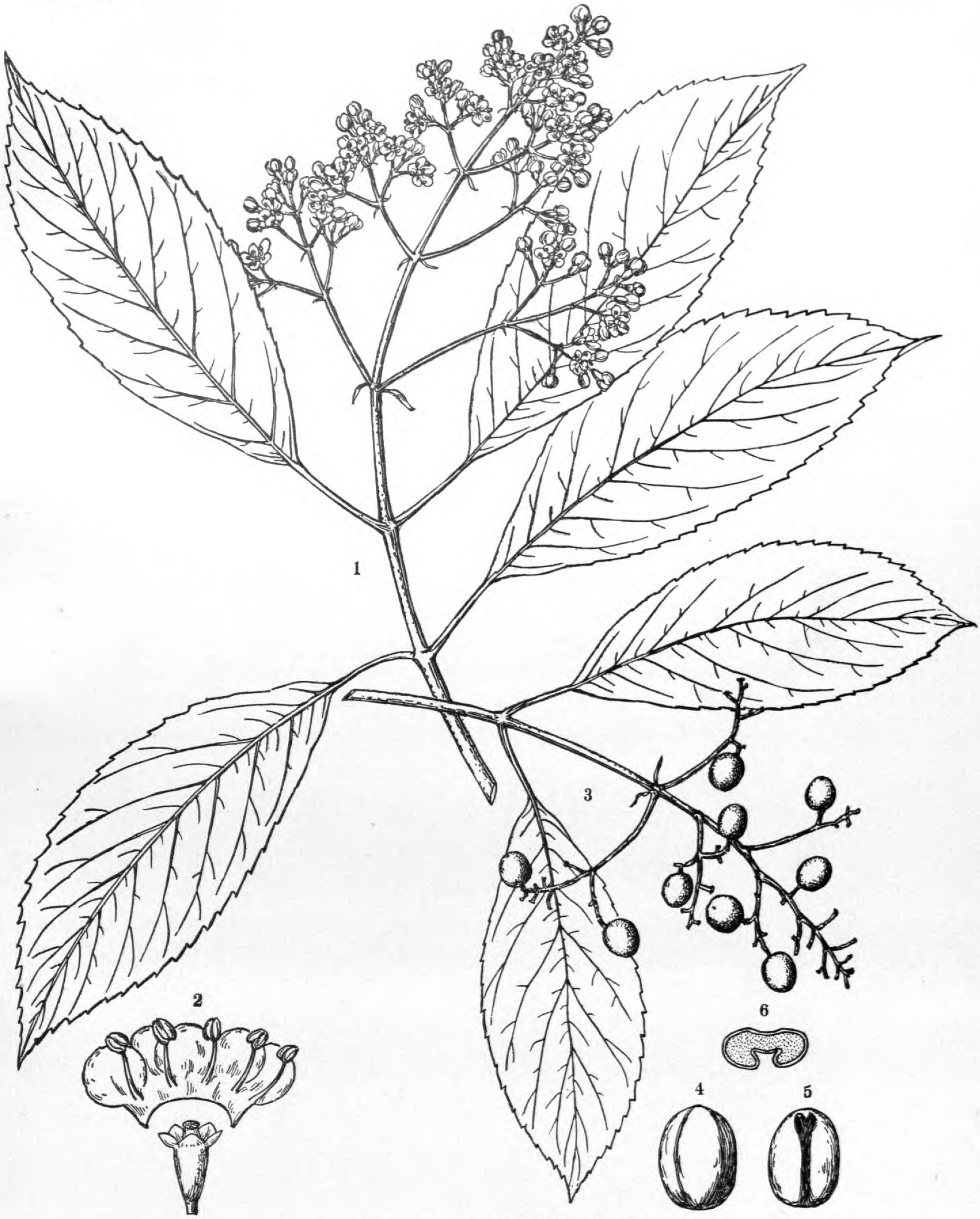
[1] The original specimen representing No. 415 of von Rosthorn's collection which has been sent to the Arnold Arboretum from Christiania by Professor Wille is named *Viburnum Henryi*, var. *xerocarpa*, in Dr. Gräbner's own handwriting, but in his account of the Viburnums of central China he describes a *Viburnum Rosthornii*, var. *xerocarpa* (*Engler Bot. Jahrb.* xxix. 586), quoting No. 415 as the type. This is apparently a slip of the pen and should have read, *Viburnum Henryi*, var. *xerocarpa*, as on the label of the type specimen. I cannot, however, find that the proposed variety differs in any way from the type of the species; the supposed dry pericarp is explained by the fact that the fruits are not fully ripe, as the shrunken and incompletely developed albumen of the somewhat narrower fruit shows.

[2] The specimen from Yunnan differs slightly in the thinner texture of the leaves, the sharper serrations, the slightly pubescent inflorescence, and in the warty branches.

EXPLANATION OF THE PLATE.

Plate CXVI. Viburnum Henryi.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.



VIBURNUM HENRYI, Hemsl.

VIBURNUM TERNATUM, REHD.

VIBURNUM TERNATUM, *n. sp.*

Leaves in whorls of three or on the weaker branches opposite, membranaceous, elliptic to oblong-obovate, acute or short-acuminate, cuneate at the base, entire, from 8 to 22 centimetres long and from 4 to 9.5 centimetres wide, yellowish green and glabrous above, lighter green and glabrous below with the exception of the long appressed hairs on the midribs, and on the five to seven pairs of veins curving and anastomosing before reaching the margin and connected by prominent transverse veinlets; petioles slender, from 2 to 5 centimetres in length, pubescent. Corymbs sessile, loose, from 12 to 17 centimetres in diameter, sparingly pubescent; rays six or seven, elongated into scorpioid cymes with umbel-like ramifications, the central ray the shortest; flowers sessile or short-pedicellate, on raylets from the second to the sixth order; calyx-tube obconical, scarcely 1 millimetre long, glabrous, the lobes very minute and indistinct, ciliate; corolla rotate-campanulate, yellowish white, about 5 millimetres in diameter, the lobes semiorbicular, 1.5 millimetres long, about equaling the tube; stamens much exceeding the corolla, from 6 to 7 millimetres long; anthers oval, yellow. Drupe red, oval-oblong; stone oval-oblong, from 6 to 7 millimetres long and nearly 4 millimetres broad, grayish white, with a groove on the ventral side and two shallower grooves on the dorsal side; seed punctulate, reddish brown.

A shrub, from 1.5 to 4 metres high, with grayish brown branches, and appressed-pubescent branchlets.

Western China: *E. H. Wilson* (No. 3736, 3736 a).

Viburnum ternatum is most nearly related to *Viburnum sambucinum*, Blume, which is easily distinguished from it by its coriaceous leaves and pedunculate inflorescence. It is remarkable for its very compound inflorescence, and for the three-whorled leaves. I should have considered the latter character an individual teratological aberration, if two specimens from different localities did not agree in this respect, while a third specimen shows a dissolved whorl, having one leaf directly below the inflorescence and the two others only a little farther down. The weaker branches have opposite leaves.

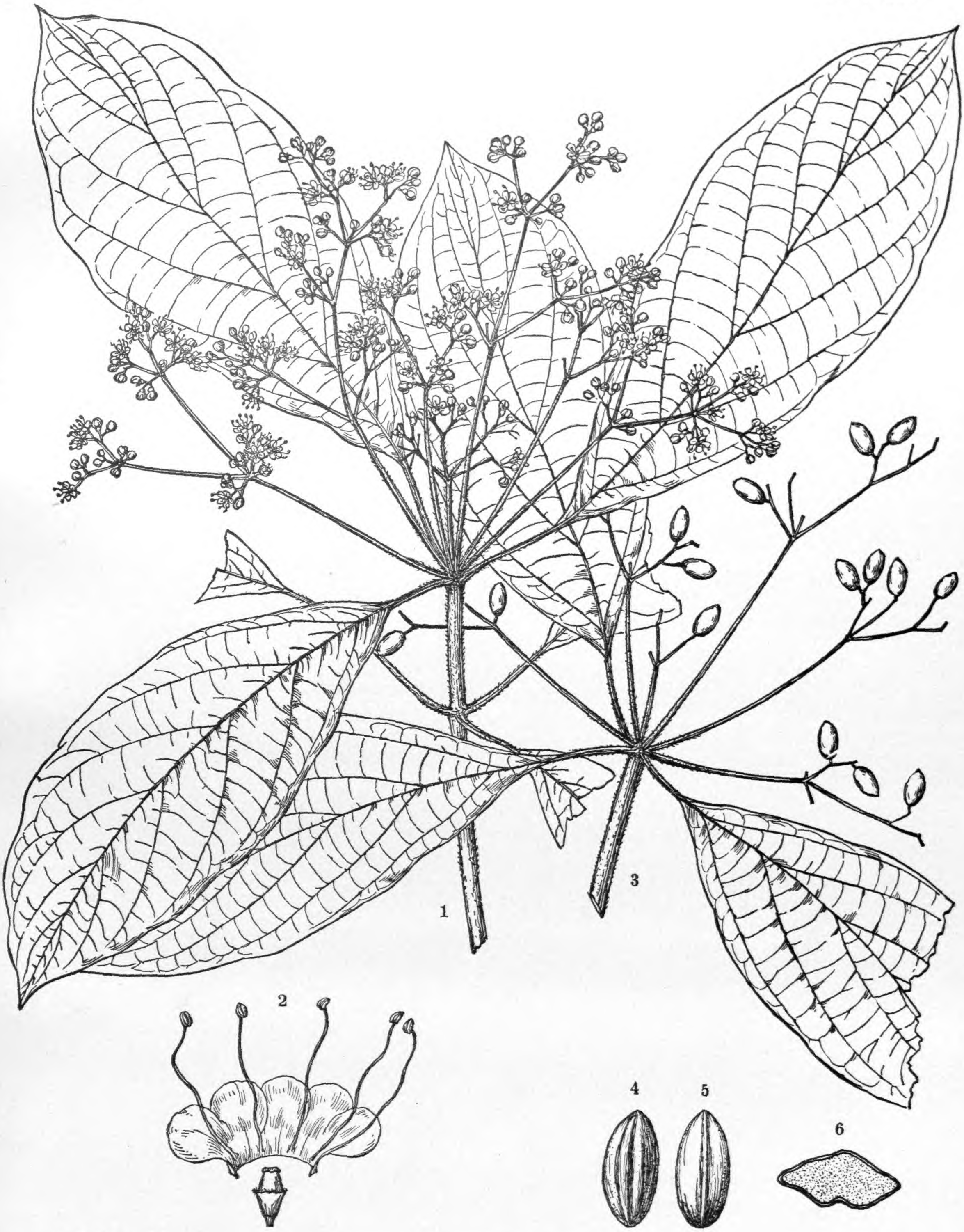
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

Plate CXVII. Viburnum ternatum.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.



C. E. Faxon del.

VIBURNUM TERNATUM, Rehd.

VIBURNUM RHYTIDOPHYLLUM, HEMSL.

VIBURNUM RHYTIDOPHYLLUM, Hemsley, *Jour. Linn. Soc.* xxiii. 355 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 586. — *Gard. Chron.* xxxix. 418, fig. 167.

Leaves oblong-ovate to oblong-lanceolate, acutish or obtuse, rounded or subcordate at the base, entire or indistinctly denticulate, persistent, thick and coriaceous, dark yellowish green, lustrous, glabrous and deeply rugose above, densely covered with a yellowish stellate tomentum beneath, elevated-reticulate, from 8 to 18 centimetres long and from 3 to 6 centimetres wide, with seven or eight pairs of primary veins, their lateral branches ending in the minute teeth of the margin; petioles stout, densely stellate-tomentose, from 1.5 to 3 centimetres long. Cymes terminal, umbel-like, rather dense, thickly stellate-tomentose, about 7 centimetres in diameter, on stout peduncles from 1.5 to 2.5 centimetres in length; rays from five to seven, stout, quadrangular, their bracts caducous; flowers sessile on raylets of the third order, furnished at the base with two linear-oblong bracts longer than the calyx-lobes; calyx stellate-tomentose, its lobes minute, broadly triangular-ovate, 1 millimetre long; corolla white, rotate-campanulate, 5 millimetres in diameter, the lobes orbicular-ovate, 1.5 millimetres in length, about equaling the tube; stamens slightly longer than the corolla; anthers oval, yellow. Drupe oval, about 8 millimetres long, red, crowned by the persistent calyx; stone oval, nearly truncate at the ends, compressed, yellowish white, 7 millimetres long and 5 millimetres broad, with two grooves on the dorsal side and three grooves on the ventral side; seed reddish brown, finely punctate, furnished with resinous dots.

A shrub, with stout densely stellate-tomentose terete branchlets. Winter-buds naked.

Central and western China: Hupeh, *A. Henry* (Nos. 6305, 7451 A), *E. H. Wilson* (No. 624); Szech'uan, S. Wushan, *A. Henry* (Nos. 5328, 5328 B), Nan-chuan, *von Rosthorn* (ex Gräbner).

Viburnum rhytidophyllum is a well-characterized species, which cannot be confounded with any other Viburnum. It has been introduced through Wilson into the Veitchian nurseries, where it has proved perfectly hardy[1] and has already flowered and produced fruit. It is a shrub of very striking appearance with its large wrinkled leaves, their dull green and lustrous upper surface contrasting beautifully with the yellowish white stellate-tomentose under surface.[2] The large and dense corymbs of white flowers followed by red berries in September add considerably to its ornamental value.

ALFRED REHDER.

Arnold Arboretum.

[1] J. H. Veitch, *Journ. Roy. Hort. Soc.* xxviii. 63, fig. 23 (1903). — *Hortus Veitchii*, 410.

[2] Veitch, *Novelties for 1907*, 10; with a figure showing the habit of the shrub.

EXPLANATION OF THE PLATE.

PLATE CXVIII. VIBURNUM RHYTIDOPHYLLUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla removed, enlarged.
4. A fruiting branch, natural size.
5. A stone, ventral view, enlarged.
6. A stone, dorsal view, enlarged.
7. Cross section of a stone, enlarged.

C. E. Faxon del.

VIBURNUM RHYTIDOPHYLLUM, Hemsl.

VIBURNUM FURCATUM, Bl.

VIBURNUM FURCATUM, Blume[1] ex Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 483 (1880); *Mél. Biol.* x. 657.

VIBURNUM PLICATUM, A. Gray, *Narr. Exp. Perry*, ii. 313 (not Thunberg) (1856).— Fr. Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, xii. No. ii. 142 (*Reisen im Amur-Lande*).

VIBURNUM LANTANOIDES, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 265 (not Michaux) (1866); *Prol. Fl. Jap.* 153. — Hance, *Jour. Bot.* viii. 276. — Franchet & Savatier, *Enum. Pl. Jap.* i. 199.

Leaves membranaceous, suborbicular to orbicular-ovate, short-acuminate, cordate or subcordate at the base, serrate, yellowish green and glabrous above, lighter green beneath, and stellate-tomentose on the veins, or rarely covered on the under surface with sparse stellate hairs, glabrous or nearly so at maturity, from 9 to 15 centimetres long and from 9 to 12 centimetres broad, with from nine to ten pairs of veins branching near the margin and ending in the teeth; petioles stout, from 2 to 3.5 centimetres in length, stellate-tomentose, enlarged at the base. Corymbs terminal on two-leafed branchlets, sessile, from 8 to 10 centimetres in diameter, with sterile radiant flowers; rays usually five, sparingly stellate-tomentose, their bracts caducous; flowers on raylets of the third or fourth order, sessile or short-pedicellate, the sterile flowers on slender pedicels; calyx-tube nearly cylindric, glabrous, about 1.5 millimetres long, the lobes broadly triangular, about one third as long as the tube; corolla rotate, from 7 to 8 millimetres in diameter, the lobes ovate, acutish, 3 millimetres in length, longer than the tube; stamens about half as long as the lobes of the corolla; anthers orbicular-ovate, yellow; sterile flowers about 2.5 centimetres in diameter, with five unequal suborbicular lobes. Drupes ovoid, crowned by the persistent calyx, scarlet, finally becoming black, fleshy; stone ovoid, compressed, with a deep furrow on the ventral side and a groove on the dorsal side, 7 millimetres long; seed covered with resinous reddish brown dots; albumen ruminate.

An upright sparingly branched shrub, sometimes 4 metres high, with forked dark red-brown smooth branches, and branchlets loosely covered while young with yellowish stellate hairs. Winter-buds large, naked, densely clothed with yellow stellate tomentum. Flowers formed in the autumn, enveloped during the winter by the scale-like bracts and bractlets of the corymb and unfolding in early spring with the leaves. Fruit ripens at the end of August.

Japan and Saghalin: without locality, Herb. Lugd.-Bat. *Blume;* Hokkaido, Hakodate, 1853–56, *C. Wright*, Sapporo, May 31, 1889, *Y. Tokubuchi*, Shiribeshi, July, 1905, *U. Faurie* (No. 6833); Hondo, hills above Nîkko, September 6, 1892, *C. S. Sargent*, Nanogawa, May 12, 1889, and Fuji-san, July 30, 1891, *K. Watanabe*, near Lake Yumoto, August 11, 1905, *J. G. Jack*, Amori, May 16, 1904, *U. Faurie* (No. 5992); Kiu-siu, Wunzen, Prov. Simabara and Kundsho-san, 1863, *Maximowicz;* Saghalin, 1861, *Fr. Schmidt.*

Viburnum furcatum is closely related to the American *Viburnum alnifolium*, Marshall, which differs chiefly from the Japanese plant in its stamens, which are longer than the corolla, and in the cross section of the ventral furrow of the seed, which resembles the letter Y. The allied Himalayan *Viburnum cordifolium*, Wallich, is easily distinguished by the absence of the radiant flowers, the stellate-pilose corolla, and the ovate leaves. The Chinese specimens which

[1] The name *Viburnum furcatum*, Blume, is mentioned first by Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 175 (1858), as a synonym of *Viburnum cordifolium*, Wallich, with the author's quotation, "Bl. in herb. Hook."

have been referred to this species belong to *Viburnum sympodiale*, Gräbner, which has stipulate petioles and smaller ovate more finely serrate leaves.

Viburnum furcatum seems to be very rare in cultivation. Like *Viburnum alnifolium*, Marshall, it prefers probably a shady position and humid light soil, leaf mould or peat, and does not thrive if treated like other Viburnums.

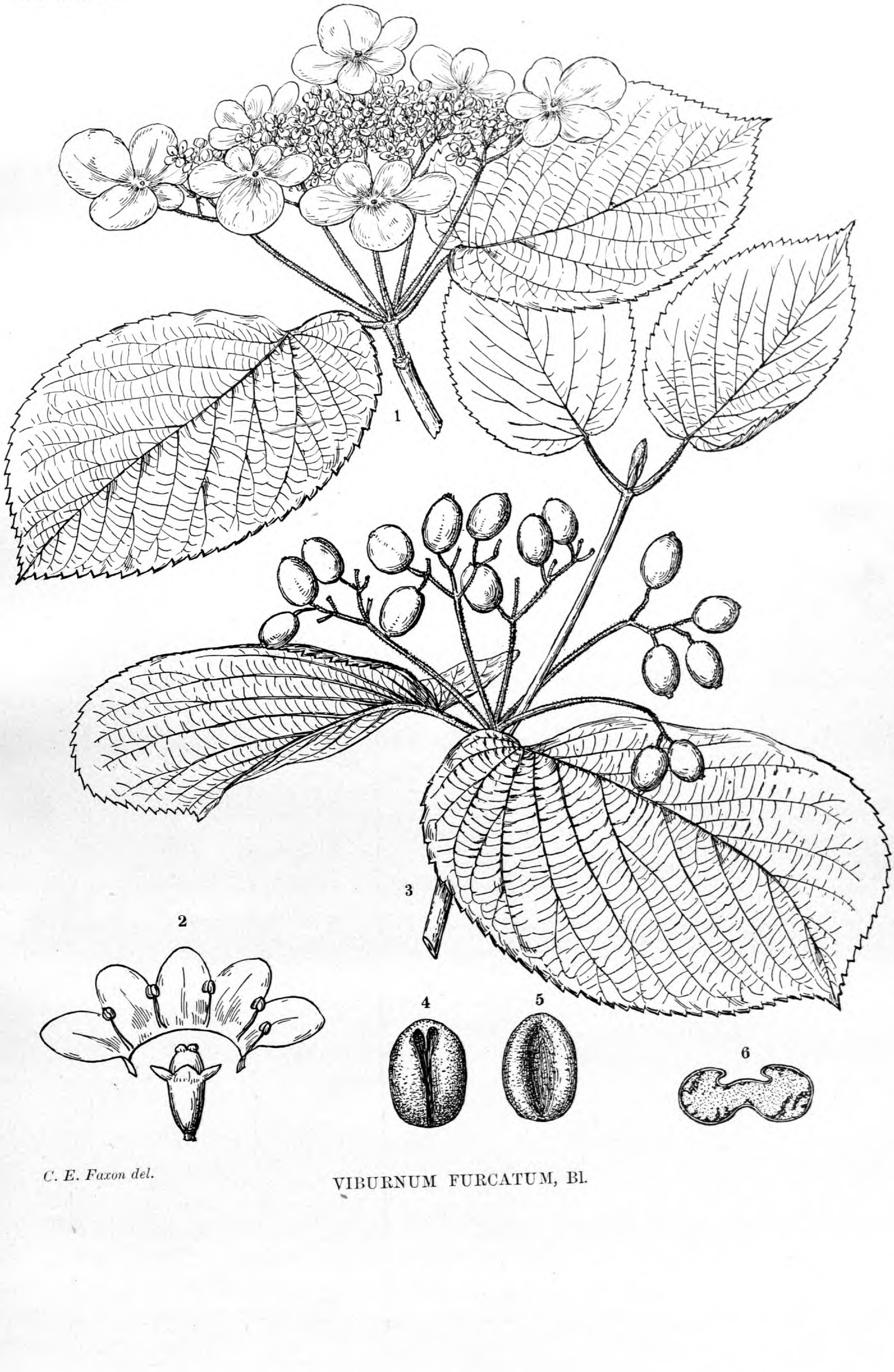
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXIX. VIBURNUM FURCATUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.



C. E. Faxon del.

VIBURNUM FURCATUM, Bl.

VIBURNUM PHLEBOTRICHUM, SIEB. & ZUCC.

VIBURNUM PHLEBOTRICHUM, Siebold & Zuccarini, *Abhand. Akad. Wiss. Münch.* iv. pt. ii. 173 (1846). — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 267; *Prol. Fl. Jap.* 155. — Franchet & Savatier, *Enum. Pl. Jap.* i. 200. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xxvi. 490; *Mél. Biol.* x. 667 (1880).

Leaves membranaceous, ovate to elliptic-ovate, acuminate, broadly cuneate or rarely rounded at the base, dentate, with broadly triangular mucronate teeth, dark green and glabrous above, lighter green and glabrous beneath with the exception of the long silky hairs on the midrib and on the six to nine pairs of straight veins ending in the teeth, from 3 to 6 centimetres long and from 1.5 to 3 centimetres broad; petioles glabrous, from 2 to 5 millimetres in length. Corymbs small, nodding, rather few-flowered, glabrous, purple, from 2 to 4 centimetres in diameter, on slender peduncles from 1.5 to 2.5 centimetres long; rays usually five, furnished like the two to five-flowered raylets with membranaceous linear-lanceolate bracts; flowers slender-pedicelled on raylets of the second order; calyx purple, about 1 millimetre long, with a subcylindric tube, and ovate-oblong acuminate lobes; corolla campanulate-rotate, usually tinged reddish near the base, 6 millimetres in diameter, the lobes ovate, about 2 millimetres in length, longer than the tube; stamens inserted a little below the incisions of the limb; filaments shorter than the oval yellow anthers. Drupe red, subglobose; stone ovoid, compressed, from 7 to 8 millimetres long and from 4.5 to 6.5 millimetres broad, yellowish white, uneven; seed with a reddish brown finely punctulate testa.

A shrub, from 1 to 2 metres high, with smooth yellowish gray branches and apparently purplish young branchlets, changing later to a very light yellowish brown. Winter-buds ovate, pointed, from 3 to 4 millimetres long, reddish brown, with two pairs of outer scales, the outer pair orbicular-ovate and about one third as long as the bud. Flowers appear in May. Fruits ripen in September.

Japan: Hondo; without locality, Herb. Lugd.-Bat., Mino, May 11, 1886, *H. Mayr*, Nanogawa, May, 1889, and October 2, 1887, and near Agamatsu, October 23, 1892, *C. S. Sargent*, Mt. Komogatake, *U. Faurie* (No. 6833), Prov. Ibaraki, *U. Faurie* (No. 3933), Lake Chuzenzi, October 26, 1905, *J. G. Jack;* Kiu-siu, Kundsho-san, 1863, *Maximowicz.*

Viburnum phlebotrichum is most nearly related to *Viburnum Wrightii*, Miquel,[1] which is, however, easily distinguished from it by its larger generally suborbicular or broadly obovate leaves, by its much larger upright corymbs and longer stamens.

Viburnum phlebotrichum seems not to be in cultivation except in Japan, and the *Viburnum phlebotrichum* of the Hand-list of the Kew Arboretum is probably *Viburnum Wrightii.*

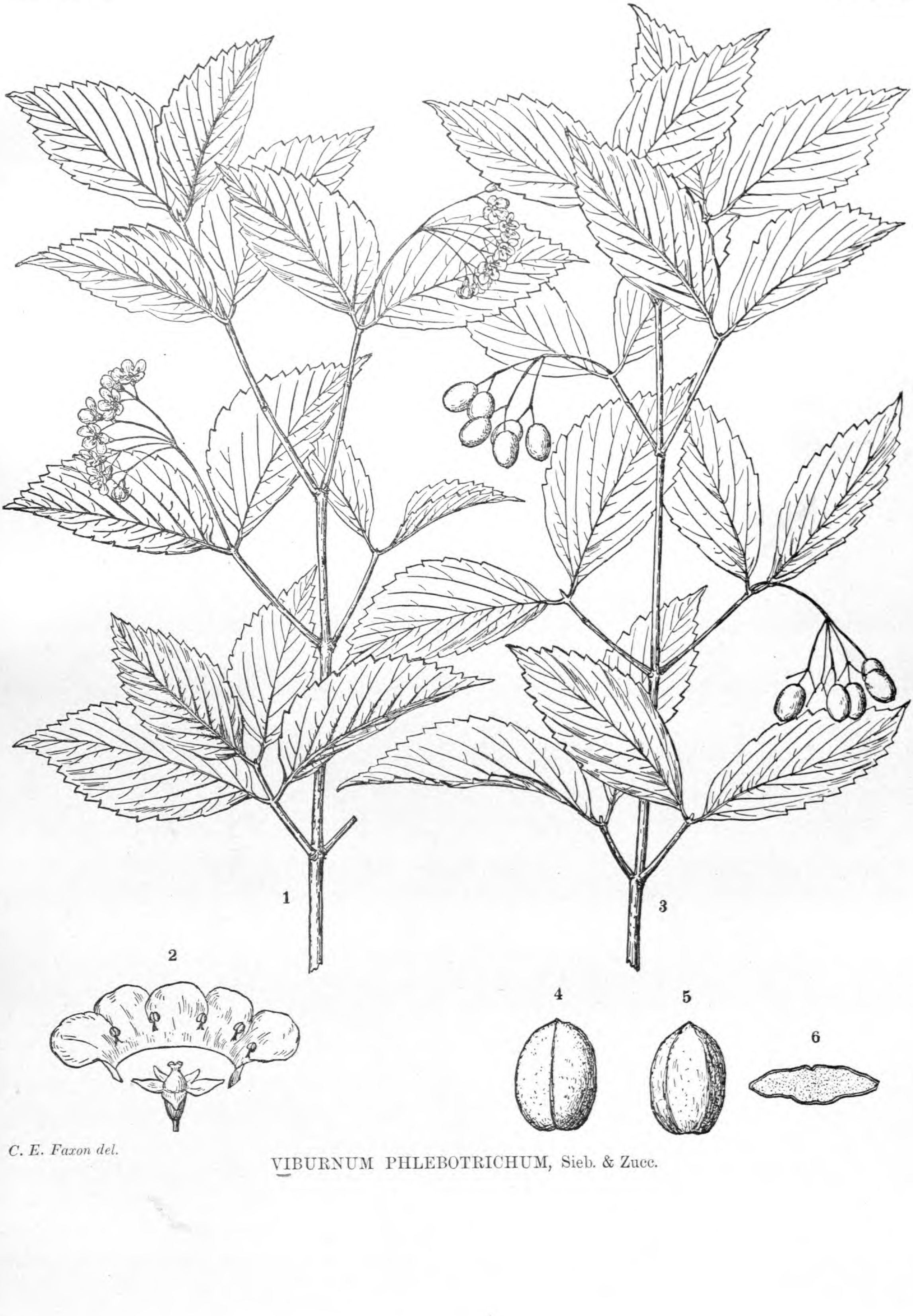
ALFRED REHDER.
Arnold Arboretum.

[1] See i. 37, t. 19 of this work.

EXPLANATION OF THE PLATE.

PLATE CXX. VIBURNUM PHLEBOTRICHUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.



C. E. Faxon del.

VIBURNUM PHLEBOTRICHUM, Sieb. & Zucc.

VIBURNUM THEIFERUM, REHD.

VIBURNUM THEIFERUM, *n. sp.*

VIBURNUM PHLEBOTRICHUM, Hemsley, *Jour. Linn. Soc.* xxiii. 354 (not Siebold & Zuccarini) (1888).— Gräbner, *Engler Bot. Jahrb.* xxix. 589.

Leaves deciduous, chartaceous or membranaceous, ovate-oblong, acuminate, rounded at the base, remotely denticulate, deciduous, from 7 to 12 centimetres long and from 3 to 5.5 centimetres wide, dark green and glabrous above, lighter green and glabrous beneath with the exception of the long silky hairs on the midribs and on the from six to eight pairs of parallel nearly straight veins ending in the teeth; petioles sparingly hairy or glabrous, from 1 to 1.5 centimetres in length. Corymbs glabrous or slightly hairy, from 2.5 to 3.5 centimetres in diameter, on upright peduncles from 1 to 2.5 centimetres long; bracts linear-oblong, membranaceous, caducous; rays usually five, from three to six-flowered; flowers on raylets of the second order, pedicellate or nearly sessile; calyx purple, scarcely 1 millimetre long, with a subcylindrical tube and ovate lobes; corolla campanulate-rotate, from 5 to 6 millimetres in diameter, the lobes ovate, about 2.5 millimetres long, longer than the tube; stamens inserted a little below the incisions of the limb, about half as long or nearly as long as the limb. Drupe red, globose-ovoid, crowned by the persistent calyx; stone ovoid, from 8 to 10 millimetres long and from 6 to 7 millimetres broad, yellowish white, uneven; seed reddish brown, finely punctulate.

An upright shrub, with smooth light grayish brown branches, and glabrous very light yellowish gray branchlets. Winter-buds oblong-ovoid, glabrous, about 6 millimetres long, with two outer pairs of scales, the outer pair of these from one half to two thirds the length of the bud.

Central and western China: Szech'uan, Kui, *E. H. Wilson* (No. 579, flowers and fruits), Changyang, *E. H. Wilson* (No. 644 in Herb. Kew), S. Wushan, *A. Henry* (No. 5586); Mt. Omei, *Faber* (ex Hemsley); Kiang-si, Hupeh, and Formosa (ex Hemsley).

Viburnum theiferum is most closely related to *Viburnum phlebotrichum*, Siebold & Zuccarini, from which it is easily distinguished by its larger and longer-stalked thicker denticulate-serrate leaves, by the longer stamens, and by the outermost scales of the winter-buds being more than half as long as the whole bud. It is a much stouter and more vigorous shrub, larger in every part. In Wilson's specimen, which I consider the type of the species, the stamens are about half as long as the limb, while in Henry's No. 5586 they are as long as the limb, and the leaves are of somewhat thinner texture.

According to Barber,[1] an infusion of the leaves of *Viburnum theiferum* furnishes the "Sweet Tea" used by the monks of the monasteries on Mt. Omei, one of the five sacred mountains of China. This is described as sweet with the flavor of coarse congou with a plentiful addition of brown sugar.

ALFRED REHDER.

Arnold Arboretum.

[1] *Travels and Researches in Western China*, 201. See, also, Helmsley, *Jour. Linn. Soc.* xxiii. 354, Hosie, *Three Years in Western China*, 172, and Bretschneider, *History of European Botanical Discoveries in China*, 729 and 769.

EXPLANATION OF THE PLATE.

PLATE CXXI. VIBURNUM THEIFERUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.

C. E. Faxon del.

VIBURNUM THEIFERUM, Rehd.

LONICERA MUCRONATA, REHD.

LONICERA MUCRONATA, Rehder, *Rep. Missouri Bot. Gard.* xiv. 83, t. 2, figs. 8 to 9 (1903).—Gräbner, *Engler Bot. Jahrb.* xxxvi. Beibl. lxxxii. 100.

Leaves coriaceous, persistent, broadly obovate to broadly oval, obtuse and mucronate, rounded or narrowed at the base, entire, ciliate and slightly revolute at the margin, from 1.5 to 2 centimetres long, bright green and glabrous or with a few scattered setose hairs on the upper surface, glaucescent and reticulate on the lower surface and sparingly appressed-pilose on the veins and veinlets, with from three to five pairs of veins; petioles appressed-pilose, about 2 millimetres in length. Flowers in pairs, on short recurved reflexed-setose peduncles from 2 to 5 millimetres long, in the axils of bud-scales at the base of the branchlets; bracts lanceolate, ciliate, about 5 millimetres in length, slightly exceeding the calyx, usually furnished at the base on the anterior side with a short lobe; bractlets none; ovaries connate, or connate for only two thirds of their length, two to three-celled, glabrous or sparingly appressed-setose; calyx-lobes minute, semi-orbicular, ciliate; corolla two-lipped, about 1 centimetre long, white, fragrant, glabrous outside, densely hirsute on the inner surface of the tube, with upright hairs, the limb slightly longer than the strongly gibbous tube; outer lobes of the posterior lip scarcely half as long as the limb, the inner ones shorter, ovate, ciliate, with a few setose hairs; anterior stamens as long as the corolla, the posterior ones shorter; filaments glabrous; anthers narrow-oblong, 2.5 millimetres in length; style as long as the corolla, glabrous. Fruit short-peduncled, subglobose, about 8 millimetres in diameter, red; seeds from three to ten in a fruit, oval, light yellowish brown, finely punctulate, 4 millimetres long.

An upright much-branched shrub, about 1 metre high, with finely pubescent branchlets furnished with reflexed setose hairs, later becoming grayish brown or light brown, the bark peeling off in fibrous threads. Winter-buds small, ovate, with two outer scales and two pairs of inner scales. Terminal buds wanting, replaced by two axillary ones. The fragrant flowers appear early in spring with the young leaves. The fruits are edible, according to Dr. Henry.

Western China: Szech'uan, S. Wushan, *A. Henry* (No. 5519), *E. H. Wilson* (No. 176), Wushan gorge, *E. H. Wilson* (No. 3738).

Lonicera mucronata is most closely related to *Lonicera Standishii*, Carrière, and *Lonicera fragrantissima*, Lindley & Paxton, but is easily distinguished from these species by the much smaller and generally obovate leaves. Wilson's No. 3738, from which the description of the hitherto unknown flowers is drawn, differs slightly from Henry's fruiting specimen in the glabrous ovary and the more cuneate leaves.

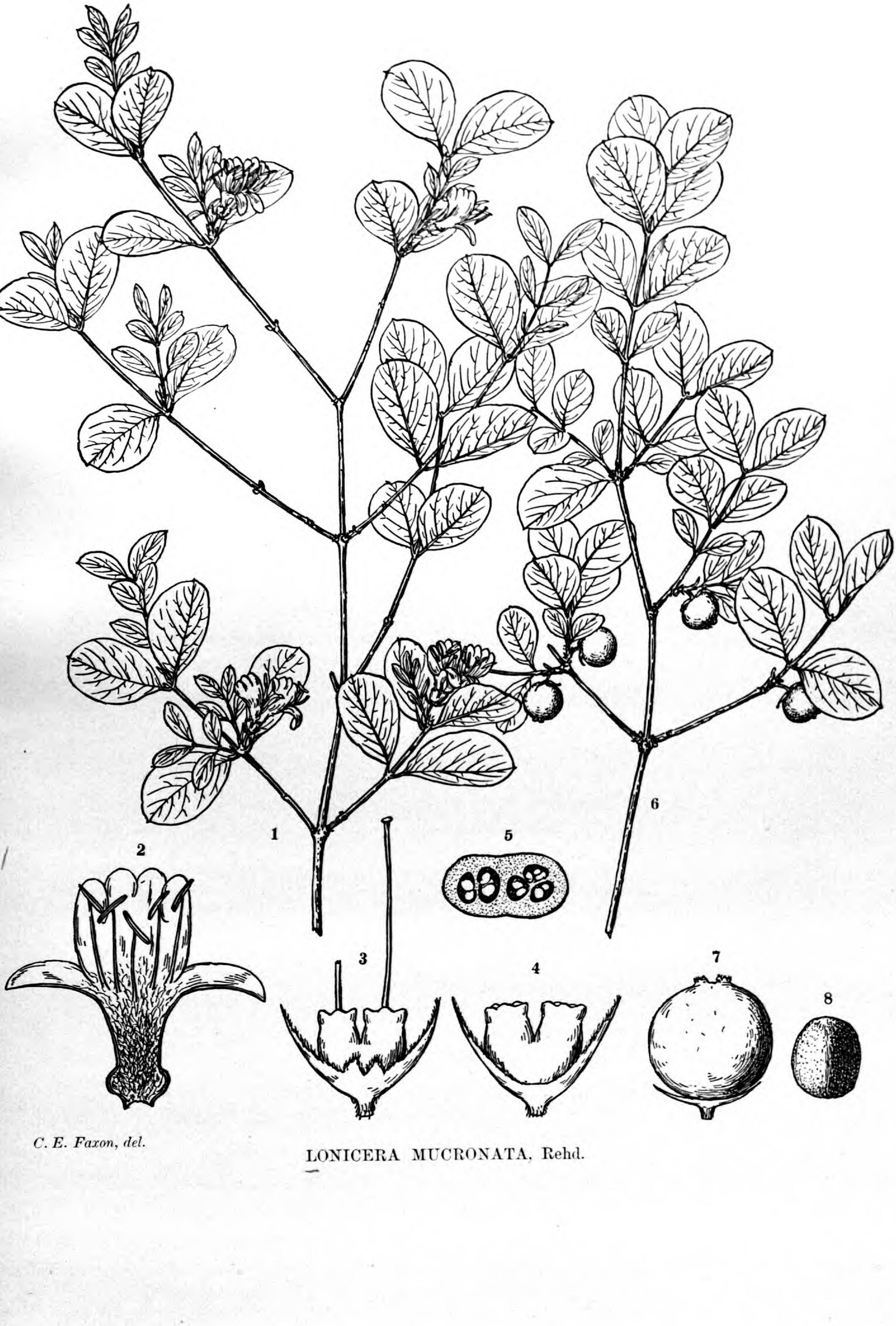
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXII. LONICERA MUCRONATA.

1. A flowering branch, natural size.
2. A corolla, laid open, enlarged.
3. A pair of ovaries, anterior view, enlarged.
4. A pair of ovaries, posterior view, enlarged.
5. Cross section of a pair of ovaries, enlarged.
6. A fruiting branch, natural size.
7. A fruit, enlarged.
8. A seed, enlarged.



C. E. Faxon, del.

LONICERA MUCRONATA, Rehd.

LONICERA RETUSA, FRANCH.

LONICERA RETUSA, Franchet, *Jour. de Bot.* x. 313 (1896). — Bois, *Jour. Soc. Hort. France*, iv. 210. — Rehder, *Rep. Missouri Bot. Gard.* xiv. 120.

Leaves deciduous, chartaceous, obovate or broadly ovate, obtuse, truncate or emarginate at the apex, rarely acutish, cuneate at the base, entire, sparingly glandular-ciliate near the base, glabrous and dark green above, with light-colored veins, glaucous and minutely hairy beneath, elevated-reticulate on both surfaces, deciduous, from 1 to 2.5 centimetres long and from 7 to 20 millimetres wide; petioles slender, purplish, glabrous, or with a few scattered glands, from 2 to 3 millimetres in length. Flowers in pairs, on short peduncles from 3 to 8 millimetres long, in the axils of the uppermost leaves of the young branchlets; bracts subulate, about half as long as the ovary, ciliolate; bractlets connate into a cupula about one third as high as the ovaries, glandular-ciliate; ovaries wholly connate or sometimes distinct at the apex, glabrous, two-celled; calyx-teeth linear-lanceolate, ciliolate, from 1.5 to 2 millimetres in length; corolla two-lipped, from 1 to 1.2 centimetres long, white, becoming yellowish, reddish at the base, glabrous outside, hirsute inside the tube, limb almost twice as long as the tube, the lobes of the posterior limb short, about one fourth as long as the limb, broadly ovate; stamens slightly exceeding the corolla; filaments glabrous except at the base; anthers narrow-oblong, 3 millimetres long; style slightly shorter than the stamens, glabrous or pubescent. Fruit shining black, subglobose, from 6 to 8 millimetres in diameter; seeds oval, light brown, finely reticulate, 3.5 millimetres long.

An upright much-branched shrub, about 2 metres high, with slender grayish branches and glabrous or very sparingly glandular branchlets, purple like the petioles and peduncles. Winter-buds ovate-oblong, acute, light brown covered by about six pairs of outer acute scales, nearly 3 millimetres long. Flowers appear in June after the leaves.

Western China: Szech'uan, Chen-keou-tin, *R. P. Farges* (in Herb. Paris), ravines 3000 metres altitude, *E. H. Wilson* (No. 3746), Ta-tsien-lu, 1897, *R. P. Mussot* (No. 171 in Herb. Drake del Castillo).

Lonicera retusa, Franchet, is most closely related to *Lonicera nervosa*, Maximowicz, and to *Lonicera kabylica*, Rehder. The former is, however, easily distinguished from it by its higher lobed cupula, the larger acute leaves light green beneath, and the latter by its ovate or oval usually acute leaves only glaucescent beneath, and by the outer lobes of the upper lip being about half as long as the limb. Wilson's specimens (No. 3746) differ slightly from the type by the generally somewhat larger and sometimes acutish leaves, by the shorter peduncles, and by the pubescent style.

Another allied species from China is described below, together with some other new Asiatic species of this genus.[1]

Lonicera retusa is now in cultivation at the Veitchian nurseries at Combe Wood, and is a graceful shrub whose chief ornamental qualities lie in the contrast between the dark green upper surface of the leaves with the bluish white under surface, and in the shining black berries. The flowers, which are borne at the end of the branchlets, are also attractive.

ALFRED REHDER.

Arnold Arboretum.

[1] NEW ASIATIC HONEYSUCKLES.

LONICERA MODESTA, *n. sp.*

Leaves membranaceous, rhombic-oval to oval or oblong, obtuse and usually mucronulate, broadly cuneate at the base, entire, minutely ciliate, dull green above and glabrous except the pubescent midrib, lighter green and reticulate and covered with a short villous pubescence chiefly on the veins and veinlets below, from 2.5 to 4 centimetres long and from 1.2 to 3.5 centimetres wide, with from six to eight pairs of veins; petioles villous, about 2 millimetres long. Flowers in pairs, on short peduncles in the axils of the upper leaves; peduncles about as long as the petioles, puberulous; bracts subulate, from 2 to 3 millimetres in length, ciliate, slightly exceeding the ovary but shorter than the calyx-lobes; bractlets connate into a cupula about one third as high as

the ovaries, glandular-ciliate; ovaries connate for from one half to two thirds of their length, glandular near the apex, three-celled; calyx-teeth linear-lanceolate, from 2 to 2.5 millimetres long, sparingly villous and ciliate with interspersed glands; corolla two-lipped, about 1.2 centimetres long, white (according to Wilson), becoming yellowish and tinged reddish at the base, sparingly puberulous outside or nearly glabrous, the tube densely hairy inside, gibbous at the base, about as long or but slightly shorter than the limb; lobes of the upper lip about one third as long as the limb; anterior stamens about as long as the limb, the posterior ones shorter; filaments glabrous except at the very base; anthers linear-oblong, 3 millimetres long; style about as long as the limb, pubescent throughout, but more sparingly toward the apex. Fruits not seen.

A shrub, sometimes 2 metres high, with brownish gray branches covered with fibrous bark, and villous-puberulous branchlets. Winter-buds ovate to ovate-lanceolate, with about five pairs of acute outer scales, and about four pairs of inner scales, the innermost pair accrescent.

Western China: Szech'uan, Chanyang, *E. H. Wilson* (No. 699).

Lonicera modesta is most closely related to *Lonicera kabylica*, Rehder. From this species as well as from *Lonicera nervosa*, Maximowicz, and *Lonicera retusa*, Franchet, it is easily distinguished by the pale green pubescent under surface of the leaves; from *Lonicera orientalis*, Lamarck, and from *Lonicera Kachkarovi*, Rehder, it differs by the cupular bractlets.

LONICERA MITIS, *n. sp.*

Leaves deciduous, oblong to oblong-ovate, obtuse and mucronate, cuneate or sometimes nearly rounded at the base, densely covered on both surfaces with a short velvety pubescence, finely ciliate, from 1 to 2 centimetres long (not yet fully developed); petioles short, puberulous. Flowers in pairs, nodding, on very short puberulous peduncles; bracts broadly ovate, rounded or subcordate at the base, acutish, from 1 to 1.2 centimetres in length, sometimes with a large lobe on one side, densely puberulous, finely ciliate, green; bractlets wanting; ovaries glabrous, distinct, three-celled; calyx very short, with an obscurely toothed margin; corolla white or yellowish, infundibuliform, glabrous outside, from 15 to 18 millimetres long, the tube slightly ventricose at the base, hairy inside, the lobes upright, broadly ovate, from 6 to 7 millimetres in length, about one third as long as the tube, usually tinged purplish near the apex; stamens inserted a little below the limb, not exceeding the corolla, the glabrous filaments only slightly longer than the oblong anthers; style as long as the corolla, hairy below the middle. Fruits wanting.

A shrub, with grayish brown branches covered with bark separating in fibrous threads, and puberulous branchlets. Winter-buds brown, glabrous, from 5 to 8 millimetres long, long-pointed, with one pair of outer scales.

Western China: Szech'uan "montes alti meridiem versus a Ta-tsien-lu in regione Rhododendrorum," 1893, *G. N. Potanin* (in Herb. St. Petersburg); Ta-tsien-lu, 9000 to 13,000 feet, *A. E. Pratt* (No. 865 in Herb. Kew).

Lonicera mitis is most closely related to the Siberian *Lonicera hispida*, Pallas, but differs chiefly from that species in the ventricose, not saccate, and shorter corolla and in the absence of the setose pubescence. Pratt's specimen differs from the one collected by Potanin, which I take as the type of the species by its more ventricose almost gibbous tube. A form collected by H. E. Hobson in Tibet has larger leaves and flowers, and is probably best considered a distinct variety of this species.

Lonicera mitis, var. *Hobsoni*, var. nov.

Leaves narrow-oblong, narrowed at the ends, mucronate, from 3 to 5 centimetres long; peduncles 1.5 centimetres long; bracts about 2 centimetres in length, sparingly setose-ciliate; corolla 3 centimetres long, with nearly equal base; otherwise like the type.

Tibet: Yatung, 1897, *E. H. Hobson* (in Herb. Kew).

LONICERA PERULATA, *n. sp.*

Leaves membranaceous, oblong-ovate to oblong, acuminate, the upper cuneate, the lower rounded or even subcordate at the base, ciliate, yellowish green and sparingly short-pilose, especially on the veins above, glandular toward the base, with small scattered reddish glands, light green and pilose on the veins beneath, from 6.5 to 8 centimetres long and from 2.5 to 3.8 centimetres wide; petioles glabrous or sparingly glandular toward the apex, about 5 millimetres in length. Flowers in pairs, on slender sparingly glandular peduncles from 3 to 4 centimetres long; bracts subulate, sparingly ciliate, exceeding the ovaries; bractlets ovate, about one fourth or one fifth as long as the distinct ovaries, glandular-ciliate; corolla two-lipped, about 1.4 centimetres long, dull dark purple, glabrous, the tube strongly gibbous and distinctly stipitate, densely hirsute inside, about one third shorter than the limb, the upper lip with short broadly ovate lobes; stamens slightly shorter than the limb; anthers narrow-oblong, purple, about 4 millimetres in length, filaments somewhat shorter, glabrous except at the base; style shorter than the stamens, glabrous in its upper third, hirsute below.

A shrub, with stout branches, and sparingly glandular branchlets, greenish or reddish during their first year, becoming purple and lustrous in their second season. Winter-buds large, with from six to eight pairs of semiorbicular to orbicular-ovate light brown persistent outer scales, and paleaceous accrescent upright inner scales.

Central China: Western Hupeh, *E. H. Wilson* (No. 2081).

Lonicera perulata is closely related to *Lonicera Webbiana*, Wallich; it differs from that species, however, chiefly in the more numerous persistent bud-scales, the inner accrescent scales not being reflexed, in the color of the branches in their second year, which is purple, not ashy gray, in the purple anthers, and in the glabrous corolla. Formerly I referred Wilson's No. 2081 to *Lonicera Webbiana*,[1] but in its winter-buds it differs so conspicuously from that species that it may better be considered as the type of a new species. The true *Lonicera Webbiana* appears to be restricted to the Himalayan Mountains.

LONICERA PROSTRATA, *n. sp.*

Leaves membranaceous, oval, obtuse or acutish, broadly cuneate or rounded at the base, from 1 to 2 centimetres long and from

[1] *Trees and Shrubs*, i. 137, t. 69; *Rep. Missouri Bot. Gard.* xiv. 108.

5 to 14 millimetres wide, light bluish green and glabrous above, with impressed veins, lighter green and slightly villous along the under surface of the midribs ; petioles villous, about 1 millimetre in length. Berries in pairs, on slender glabrous peduncles about 1 centimetre long, in the axils of the lower leaves of the branchlets; bracts linear-lanceolate, ciliate, sparingly glandular near the base, slightly villous on the back, about 4 millimetres long; the two bractlets of each flower connate into a two-lobed suborbicular glabrous paleaceous bract about 4 millimetres in length, berries perfectly distinct, ovoid, light red, crowned with the large campanulate partly persistent calyx about 6 millimetres long, apparently indistinctly toothed, and splitting to the base into two parts; seeds short-ovoid, compressed, yellowish white, about 2 millimetres in length.

A prostrate shrub, with long slender hollow branches, and branchlets sparingly villous and usually purplish while young, becoming later light grayish brown, their bark separating into fibrous threads. Winter-buds small, consisting of a few outer scales and several accrescent inner scales. Flowers not known. Fruits ripening in September.

Western China: Szech'uan, Sungpan, *E. H. Wilson* (No. 3742), at about 4000 metres altitude.

Lonicera prostrata, which seems most closely related to *Lonicera trichosantha*, Bureau & Franchet, and to *Lonicera ovalis*, Batalin, is easily distinguished from them by its prostrate habit and small leaves. In these characters it strongly resembles some species of the subgenus Isoxylosteum, especially *Lonicera syringantha*, Maximowicz, and *Lonicera Myrtillus*, Hooker f. & Thomson, but the hollow branches and the characteristic shape of the bractlets and calyx leave no doubt of its true affinity. It is the only known prostrate species of the section Cœloxylosteum.

EXPLANATION OF THE PLATE.

PLATE CXXIII. LONICERA RETUSA.

1. A flowering branch, natural size.
2. A corolla laid open, enlarged.
3. A pair of ovaries, enlarged.
4. Cross section of a pair of ovaries, enlarged.
5. A fruiting branch, natural size.
6. A seed, enlarged.

C. E. Faxon del.

LONICERA RETUSA, Franch.

PINUS GREGGII, ENGELM.

PINUS GREGGII, Engelmann ex Parlatore, *De Candolle Prodr.* xvi. pt. ii. 396 (1868). — Gordon, *Pinetum*, ed. 2, 270. — Engelmann, *Trans. St. Louis Acad. Sci.* iv. 177. — Hemsley, *Bot. Biol. Am. Cent.* iii. 187.

PINUS PATULA, var. BENTHAM, *Pl. Hartw.* No. 442, 58 (not Schlechtendal & Chamisso) (1840). — Loudon, *Encycl.* 993.

PINUS PATULA, β STRICTA, Endlicher, *Syn. Conif.* 157 (1847). — Gordon, *Gard. Mag.* vi. 638; *Pinetum*, ed. 2, 279. — Carrière, *Traité Conif.* 329.

PINUS PATULA, var. MACROCARPA, Masters, *Gard. Chron.* ser. 3, ix. f. 92 (1891).

Leaves in fascicles of threes, slender, erect, serrate, from 7 to 10 centimetres long, their sheaths short, pale chestnut-brown, persistent; resin ducts medial, hypoderm very weak; fibro-vascular bundles double. Pistillate flower subterminal; one-year-old cones pseudo-lateral by the growth of summer shoots, erect, stalked, in clusters of two, three or more, their scales armed with small prickles usually deciduous from the mature cones. Mature cones appearing sessile by the development of the basal scales, reflexed, oblique, very persistent, often serotinous for several years, lustrous, of various shades of ochre yellow, from 6 to 12 centimetres long, their scales more or less tumid, much larger on the outer side than on the side next to the branches, sometimes irregularly developed, the umbo small and eccentrically placed near the base of the apophysis.

A tree, about 15 metres high, with long slender spreading branches, and small branchlets covered with a glaucous bloom, the decurrent bases of the bracts at first conspicuous, becoming gradually merged in the smooth gray persistent bark of the branches.

Mexico: near Saltillo, *J. Gregg* (No. 402), 1847, *C. G. Pringle* (No. 10142), and *G. R. Shaw*, November, 1905.

Dr. Gregg's specimen, on which the species is founded, may be seen in the Engelmann collection at St. Louis and in the Gray Herbarium where, in each case, the species is represented by a single cone and a very short branchlet bearing leaves. Gregg found this Pine near Saltillo (incorrectly printed Sullillo in De Candolle's *Prodromus*), an important city of Coahuila. In 1905, in company with Mr. Pringle, I collected the species on the slopes of the Cañon de las Iglesias about five miles to the southeast of Saltillo.

The cones of *Pinus Greggii* are remarkably like those of *Pinus patula*, Schlechtendal & Chamisso, in form, reflexed position on the branch, persistence and tendency to cluster, but in color they are distinctly yellow rather than brown. In both species the peduncle of the young cone becomes overgrown and concealed by the basal scales. In habit there could be no greater contrast than between the short erect sparse foliage of *Pinus Greggii* and the dense pendent long leaf masses of *Pinus patula*. They differ quite as much in the bark of their branches and trunks. For a number of years the bark of *Pinus Greggii* persists and grows with the increasing diameter of the wood, and the upper trunk and branches are as smooth and as gray as the bark of *Pinus glabra*, Walter, of southeastern North America. The bark of *Pinus patula*, on the contrary, is continuously deciduous for several years, and its upper trunk and branches, like those of *Pinus sylvestris*, Linnæus, and *Pinus densiflora*, Siebold & Zuccarini, are conspicuously red.

The original description of *Pinus patula* (*Linnæa*, vi. 354 [1831]) does not mention the bark. Loudon (*Encycl.* 992 [1842]) describes "the branches covered with a smooth lead-colored and persistent epidermis," a description that applies perfectly to *Pinus Greggii* and to no other known Mexican Pitch Pine. Carrière, Parlatore, and Gordon have wholly or partly adopted Loudon's description of the bark of *Pinus patula*. On the other hand, Veitch's *Manual of Conifers* (ed. 2, 355), whose author had profited by an examination of the fine cultivated specimens in the British Isles, describes the "light reddish brown branches" of *Pinus patula*. An explanation may perhaps be found here for the

confusion that has prevailed with regard to the bark of the two species. Loudon's description was inspired by Hartweg's recent collections in Mexico and probably by such information as he sent with them. Probably Loudon's description of the bark was copied from Hartweg. Hartweg's specimen No. 442 (Bentham, *Pl. Hartw.* 58), and all specimens with patula-like cones and short erect leaves, are probably *Pinus Greggii.*

A specimen at Berlin labeled *Pinus Greggii* is apparently correct as to the leaves, but the cones so labeled in another part of the museum belong to another species.

The figure from *The Gardener's Chronicle*, quoted above, is from a tree cultivated by the brothers Rovelli at Pallanza, in Italy, under the name *Pinus del Doctor*, or *Pinus subpatula*, Roezl. These are both unpublished names.

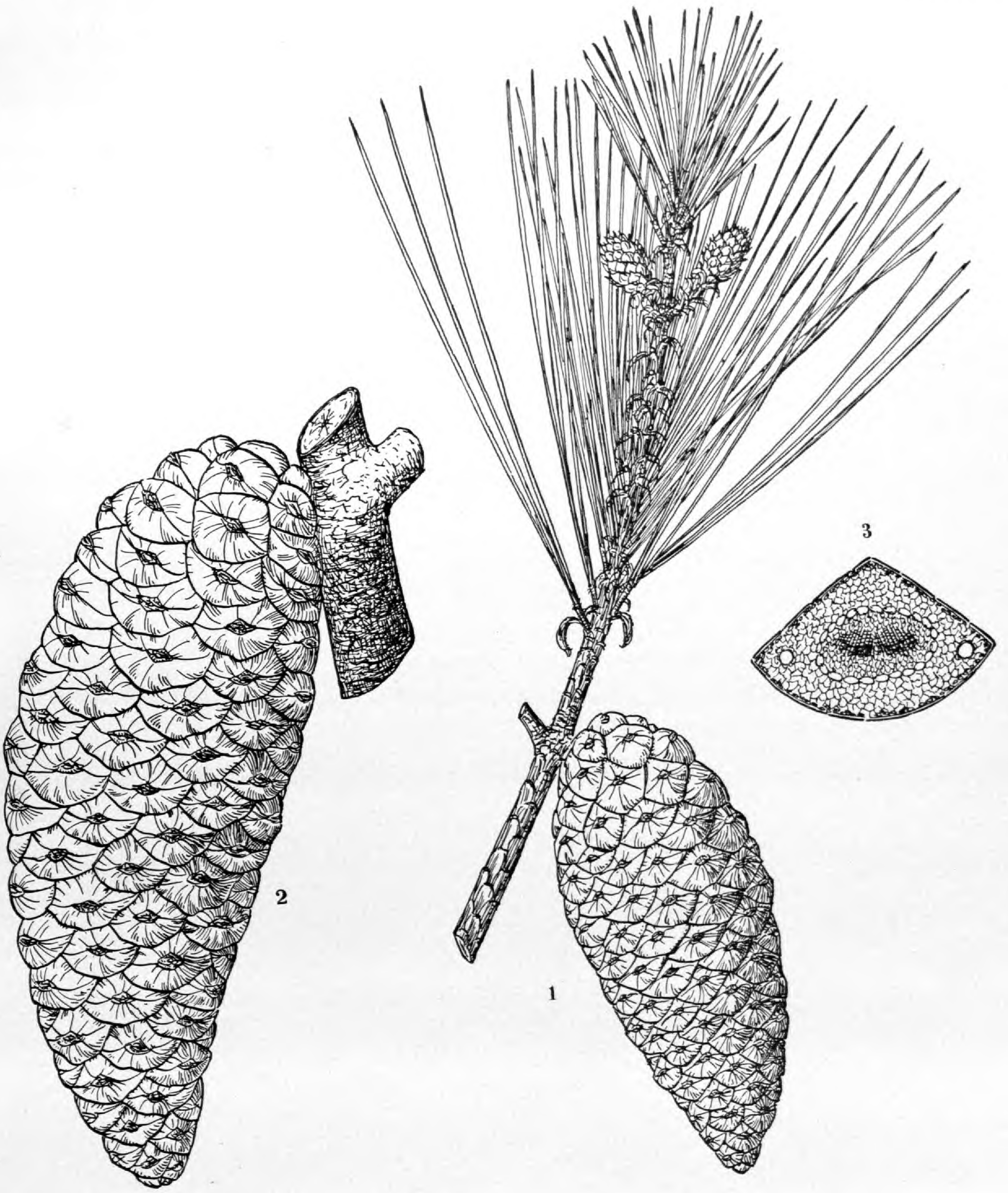
GEORGE RUSSELL SHAW.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXIV. PINUS GREGGII.

1. A branch with leaves and cones, natural size.
2. A cone, natural size.
3. Cross section of a leaf, much enlarged.



C. E. Faxon del.

PINUS GREGGII, Engelm.

PINUS LUMHOLTZII, ROBINS. & FERN.

PINUS LUMHOLTZII, Robinson & Fernald, *Proc. Am. Acad. Sci.* xxx. 122 (1894). — Masters, *Jour. Linn. Soc.* xxxv. 591.

PINUS PATULA, Seemann, *Bot. Voy. Herald*, 336 (not Schlechtendal & Chamisso) (1852–1857). — Hemsley, *Bot. Biol. Am. Cent.* iii. 189 (Seemann No. 1961).

Leaves serrate, in fascicles of threes, from 2 to 3 decimetres in length, pendent, their sheaths loose, long, chestnut-brown, lustrous, deciduous after the first season; resin ducts medial and internal; hypoderm in a single or double row of thick-walled cells detached from the epidermis by a layer of thin-walled cells; fibro-vascular bundles double and contiguous or often merged in one. One-year-old cones subterminal and lateral on younger trees, usually subterminal on older trees, long-stalked, their scales tumid and armed with weak prickles. Mature cones on curved peduncles from 4 to 7 centimetres long, pendent, symmetrical or slightly oblique, ovate-conical or nearly cylindrical, early deciduous, the apophyses tumid, sublustrous, ochre-brown, the umbo often apparently double from a dark border.

A round-headed tree, about 15 metres high, with long thin branches, slender drooping chestnut-brown more or less pruinose branchlets, their bark separating during a few seasons in thin scales, finally becoming more persistent and forming rough ridges even on young stems.

Mexico: Western Sierras, *B. Seemann*, 1849 (No. 1961), *C. V. Hartman*, Coloradas, Chihuahua, 1893 (No. 541); *J. N. Rose*, Santa Teresa, Tepic (No. 2194); Plateado, Zacatecas (No. 2989); Bolaños, Jalisco (No. 3083), Mesquitec, Jalisco, 1897 (No. 3586), *E. W. Nelson*, San Sebastian, Jalisco, 1897 (No. 4112), *C. G. Pringle*, Etzatlan, Jalisco, 1905 (No. 10014), *G. R. Shaw*, Etzatlan and Ferraria de Tula, Jalisco, 1905.

The foliage of this remarkable Pine is absolutely pendent, not drooping in easy curves like the leaves of *Pinus patula*, Schlechtendal & Chamisso, or *Pinus excelsa*, Wallich, but hanging as if lifeless and artificially attached to the branches, producing an effect best described by the popular name of this species in southern Jalisco, "Pino barba caida." The abrupt drooping of the leaves is caused by the weak tissues which underlie the sheaths; as a result of this the bright chestnut sheaths are brought into nearly perfect alignment and form a conspicuous border to the green foliage masses of the first season. The contrast between the younger foliage and the sheathless leaves of the foliage in its second year is so marked that the two growths are easily distinguished at some distance from the tree. From the examination of a stump at Tula this species appears sometimes to produce, like *Pinus rigida*, Miller, and *Pinus leiophylla*, Schlechtendal & Chamisso, shoots from adventitious buds.

Pinus Lumholtzii is confined to the western Sierras of Mexico, occupying about ten degrees of latitude. Dr. Lumholtz first observed it at Tutuhuaca, about the latitude of the City of Chihuahua, and it has been collected in southern Jalisco. The first specimen, as far as I know, is Seemann's No. 1961 in the Kew Herbarium, collected during the voyage of the Herald in 1849 and labeled with the indefinite locality "N. W. of Mexico." A few of Seemann's cones are in the collection of the Arnold Arboretum. Our knowledge of this Pine is due to the collection made by C. V. Hartman of the Lumholtz Expedition. There is a portrait of the species in Lumholtz's *Unknown Mexico* (i. 408), and in his article in *Scribner's Magazine* (xvi. 38). According to Lumholtz it is one of six species of Pine known to the Tarahumare Indians, who use an infusion of the leaves for a stomachic and its wood in the manufacture of their violins.

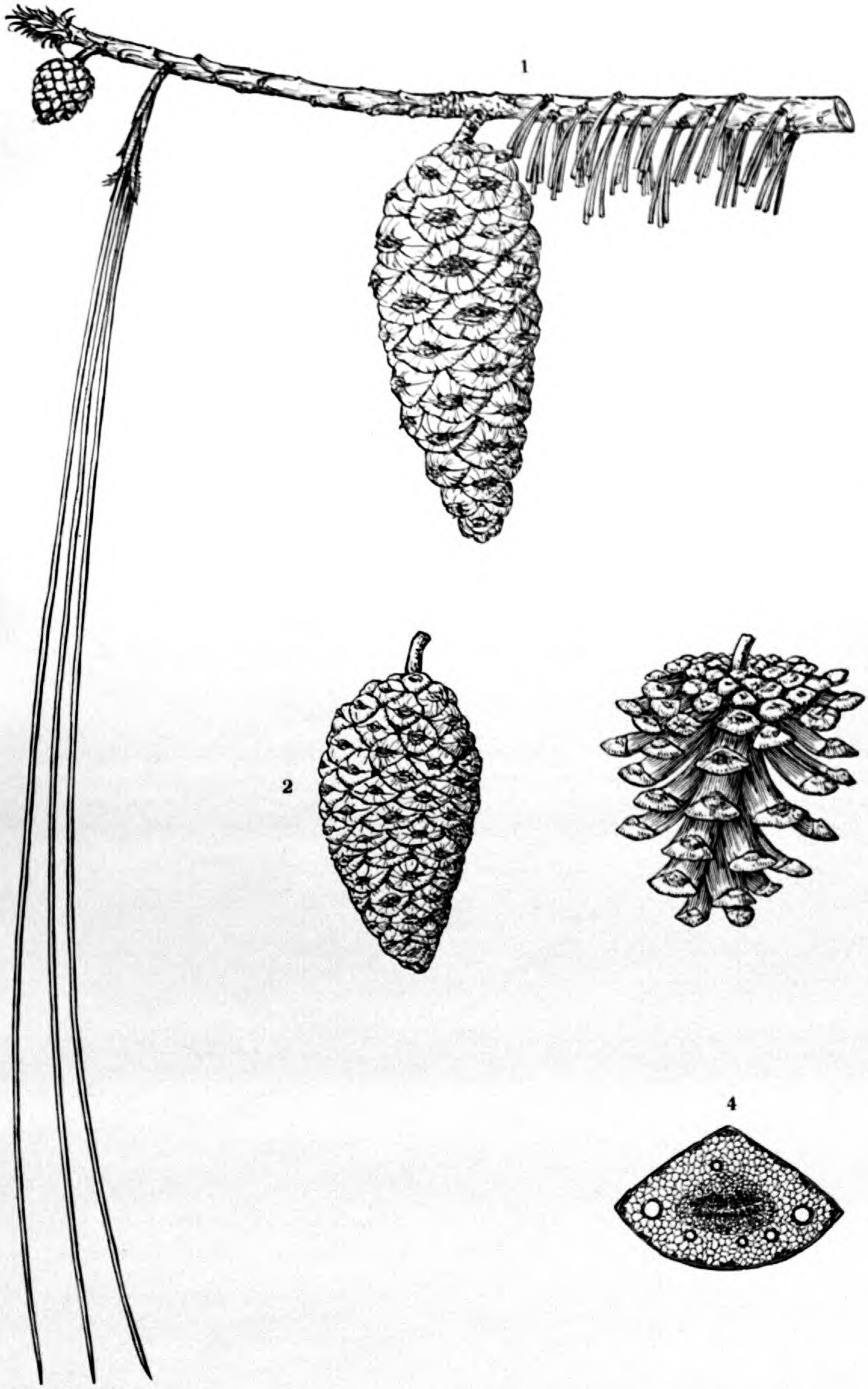
GEORGE RUSSELL SHAW.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXV. PINUS LUMHOLTZII.

1. A branch with cones and leaves, natural size.
2. A cone, natural size.
3. A cone, natural size.
4. Cross section of a leaf, much magnified.



C. E. Faxon del.

PINUS LUMHOLTZII, Robins. & Fern.

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

Professor Sargent is recognized as the highest authority on the subject he treats. His position as Director of the Arnold Arboretum of Harvard University, the richest dendrological collection in America, which has been formed by him, and his opportunities while in the employ of the government of the United States for exploring the forests and studying the trees in every part of the country, opportunities supplemented by his connection with the Northern Transcontinental Survey, and by the duty intrusted to him of forming for the New York Museum of Natural History a collection to illustrate the forest products of North America, specially qualify him for this work, in the preparation of which he has been actively engaged during the last twenty-five years.

No cost or pains have been spared in the mechanical execution of the illustrations of this work, which has taken the first rank among those great scientific works of which Americans are justly proud. It must always remain a standard authority on the subject which it treats.

The price of the *Silva* is $25 net a volume, or $350 for the set, and only subscriptions for the entire work will be accepted.

Specimen pages and a sample plate will be submitted upon request. Address,

HOUGHTON, MIFFLIN & COMPANY,
4 Park St., Boston.

MANUAL OF THE TREES OF NORTH AMERICA

(EXCLUSIVE OF MEXICO)

THIS volume contains brief descriptions in plain and simple language of some 630 trees, accompanied by a figure of the leaves, fruits, and flowers of each tree, with keys leading to a ready determination of the genera and species. The illustrations are a feature of the book. They are reproductions of drawings made by Mr. Charles E. Faxon, the artist who made the illustrations for "The Silva of North America," and exhibit in a remarkable degree his skill, knowledge, and taste, — the salient or more characteristic features of each species being shown in an admirable manner.

Professor Sargent's descriptions bring out the botanical characters of each genus and species, its geographical distribution and economic value, and its relationship to other species of the same group growing in other parts of the world. The book represents in condensed form the life-work of the author and of the artist in studying, describing, and illustrating the trees of North America, which they have succeeded in making known as the trees of no other continent are known.

The Manual makes available in convenient form the most essential points of the treasures of information to be found in "The Silva of North America." It will be indispensable to every one interested in nature, but especially to all

BOTANISTS, TEACHERS, FORESTERS,
LANDSCAPE-GARDENERS, HORTICULTURISTS,
NURSERYMEN, PARK SUPERINTENDENTS,
AND THE OWNERS OF COUNTRY PLACES.

As a convenient handbook it will serve as a guide to the trees to persons traveling in different parts of this country. Professor Sargent is, without doubt, the greatest living authority on his subject, and his new work will fill a place similar to that long held by Gray's Manual of Botany.

"An admirable book in every way by a past master in his subject, a book that goes straight to the foundations and that every one that loves trees must have." — *New York Sun.*

"A close study of its pages reveals Professor Sargent's careful methods of work, his accuracy, his clear descriptive powers, his exactitude of statement and his marvellous, wide, and minute knowledge of every branch of the subject. . . . Its standard position as the one authoritative record of North American trees is unquestioned." — *Boston Evening Transcript.*

WITH 644 ILLUSTRATIONS BY C. E. FAXON

In green buckram, 8vo, $6.00, *net.* Postpaid.

Specimen pages and a sample plate will be submitted upon request. Address

HOUGHTON, MIFFLIN & COMPANY
4 Park Street, Boston

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

VOL. II, PART II

Issued May 1908

BOSTON AND NEW YORK
HOUGHTON, MIFFLIN AND COMPANY
The Riverside Press, Cambridge
1908

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest*. The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts. The parts will be sold separately, at $5.00 *net*, carriage paid. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

HOUGHTON, MIFFLIN AND COMPANY

4 PARK STREET, BOSTON

MAGNOLIA KOBUS, DC.

MAGNOLIA KOBUS, De Candolle, *Syst.* i. 456 (excl. syn. in part) (1818); *Prodr.* i. 81. — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. ii. 187. — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 258; *Prol. Fl. Jap.* 146. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvii. 417 (in part); *Mél. Biol.* viii. 507 (in part). — Franchet & Savatier, *Enum. Pl. Jap.* i. 16. — Keisuke Ito, *Icon. Bot. Gard. Koishikawa*, i. t. — Koehne, *Deutsche Dendr.* 145. — C. K. Schneider, *Ill. Handb. Laubholzk.* i. 329, f. 207, A–G, f. 209, C–D.

MAGNOLIA KOBUSHI, Mayr, *Fremdl. Wald- und Parkbäume*, 484, f. 207 (1906).

Leaves obovate, gradually or abruptly narrowed at the apex into a short broad point, gradually narrowed and cuneate at the base, slightly thickened on the entire involute margins, glabrous with the exception of small axillary tufts of white hairs below, dull dark green on the upper surface, paler on the lower surface, from 6 to 7.5 centimetres long and from 4.5 to 5 centimetres wide, with thin midribs, and seven or eight pairs of primary veins connected by conspicuous reticulate veinlets; petioles slender, from 1.2 to 1.8 centimetres in length. Flowers cup-shaped, white, from 5 to 6 centimetres long; sepals oblong-ovate, acute, from 1.5 to 1.8 millimetres long; petals oblong-obovate, rounded or acute at the apex, gradually narrowed to the base, thin, punctulate, about 1.5 centimetres in length; tips of the anthers apiculate, short and straight. Fruit oblong, often unsymmetrical, usually from 4 to 5 centimetres long, dark green; carpels ovate, rounded at the apex, conspicuously punctate; seeds broader than high, thicker at the apex than at the base, from 1 to 1.2 centimetres wide and from 8 to 10 millimetres high; outer coat of the testa thick and fleshy, the inner crustaceous, black and lustrous.[1]

A broad open shrub (in cultivation), 4 or 5 metres high, with numerous stout stems covered with smooth pale gray bark, small ascending branches, and slender branchlets conspicuously marked by the scars of fallen stipules and by small pale lenticels, light yellow-green in their first winter, rather bright reddish brown the following year, and later dull reddish brown. Winter-buds ovate, full and rounded on one side, nearly straight on the other, narrowed to the obtusely pointed apex, thickly coated with long brownish hairs, from 1.8 to 2 centimetres long and from 6 to 8 centimetres in diameter.

Japan: Hondo, Hakone, *Maximowicz*, 1861 (in Herb. Gray).

This plant is said to be common in the mountain forests of Hondo; but in Japan I saw it only in the Botanic Garden at Tokio. *Magnolia Kobus* was introduced into the United States through the Parsons Nursery at Flushing, New York, certainly as early as 1870, and was distributed under the unpublished name of *Magnolia Thurberi*. It has been an inhabitant of the Arnold Arboretum since 1879 and for several years has flowered and ripened its fruit here. The flowers, however, are not produced in much profusion, and as an ornamental plant it is inferior to the Chinese Yulan Magnolia and its various hybrids and varieties. A tree of northern Hondo and of Hokkaido has usually been referred to *Magnolia Kobus*. This is perhaps a distinct species, but with our existing knowledge of these two Japanese Magnolias it may, perhaps, best be considered a geographical variety as

MAGNOLIA KOBUS, var. BOREALIS, *n. var.*

Magnolia Kobus, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xvii. 417 (in so far as relates to Hokkaido) (1872); *Mél. Biol.* viii. 507. — Sargent, *Garden and Forest*, vi. 64, f. 11; *Forest Flora of Japan*, 9, t. 3.

Japan: Hokkaido, Hakodate, *Maximowicz*, 1861 (in Herb. Gray), Sapporo, *Miyabe*, 1880; *C. S. Sargent*, September

[1] The first description of *Magnolia Kobus* was published by Kaempfer in his *Fasciculi Amœnitatum Exoticarum* in 1712. There is an excellent figure of a flowering branch (t. 44) from a drawing by Kaempfer published in 1791 by Sir Joseph Banks in the *Icones Selectæ Plantarum* of Kaempfer.

17, 1892; *J. G. Jack*, August 23, 1905; Hondo, near Amori, *C. S. Sargent*, September 13, 1892, Mt. Chokaizan, *J. H Veitch*, September 14, 1892; near Amori, *U. Faurie*, May, 1900 (No. 3875 in Herb. Arnold Arboretum).

In the forests of central Hokkaido this is a tree usually from 20 to 30 metres high, with a tall straight trunk sometimes 2 decimetres in diameter, and short branches forming a narrow pyramidal or finally a round-topped head. From the typical *Magnolia Kobus* it seems to differ only in its much larger leaves, larger flowers, with often proportionately broader petals, larger fruits, stouter branches, larger winter-buds, and in the arborescent habit which even young plants assume in cultivation.

This fine tree was sent to the Arnold Arboretum in 1876 from Sapporo by the late W. S. Clark, President of the Agricultural College of Hokkaido. It is here a fast-growing very hardy tree, but in cultivation it produces its handsome flowers even more sparingly than *Magnolia Kobus*.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXVI. MAGNOLIA KOBUS.

1 A flowering branch, natural size.
2. An anther, front view, enlarged.
3. An anther, rear view, enlarged.
4. A fruiting branch, natural size.
5. A seed.
6. A seed, the outer layer of the testa removed.
7. A sterile branch, natural size.
8. A winter branch, with flower-buds, natural size.

C. E. Faxon del.

MAGNOLIA KOBUS, DC.

CRATÆGUS SEVERA, SARG.

(Crus-galli.)

CRATÆGUS SEVERA, *n. sp.*

Glabrous with the exception of the hairs on the upper side of the midribs of the young leaves. Leaves oval to slightly obovate, acuminate or rarely rounded at the apex, gradually narrowed to the long concave-cuneate entire base, and coarsely doubly serrate above, with straight or incurved glandular teeth; deeply tinged with red and sparingly villose above when they unfold, more than half grown when the flowers open and then thin, yellow-green, and almost glabrous, and at maturity subcoriaceous, dark green and very lustrous on the upper surface, pale bluish green on the lower surface, from 6 to 7 centimetres long and from 3.5 to 4 centimetres wide, with prominent midribs and primary veins; petioles stout, wing-margined generally to below the middle, occasionally glandular toward the apex, with minute deciduous glands, from 8 to 10 millimetres in length; leaves on vigorous shoots thicker, rather larger, and more coarsely serrate, with stout midribs, conspicuous primary veins, and foliaceous lunate glandular-serrate often persistent stipules. Flowers from 1.2 to 1.3 centimetres in diameter, on slender pedicels, in wide lax mostly eighteen to twenty-flowered corymbs, the long lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate, entire or minutely glandular-dentate near the middle, reflexed after anthesis; stamens ten; anthers pale pink; styles two or three, surrounded at the base by a narrow ring of pale white hairs. Fruit on slender pedicels, in few-fruited drooping clusters, subglobose, sometimes broader than high, truncate at the ends, dark green more or less tinged with red, from 1.2 to 1.4 centimetres in diameter; calyx little enlarged, with a wide shallow cavity, and small spreading closely appressed lobes, their tips often deciduous from the ripe fruit; flesh thin, hard, dry, and mealy; nutlets usually three, rounded and obtuse at the ends, or when three somewhat narrowed at the apex, ridged on the back, with a high wide deeply grooved ridge, from 7 to 7.5 millimetres long and from 3.5 to 4 millimetres wide.

A tree, 7 to 8 metres high, with a trunk sometimes 3 decimetres in diameter, large horizontal branches forming a wide round-topped symmetrical head, and stout slightly zigzag branchlets light yellow-green tinged with red when they first appear, becoming dark brown or purple, lustrous and marked by small pale lenticels in their first season and dull gray-brown the following year, and armed with many stout nearly straight gray spines from 5 to 6.5 centimetres long, and persistent and compound on old trunks and branches. Flowers appear about the 10th of May. Fruit ripens early in October.

Low moist soil near streams, Grandin, Shannon County, Missouri, *C. S. Sargent* (No. 5 type), October 1, 1900, *B. F. Bush* (No. 410 from the same tree), May 10, 1901.

From *Cratægus Crus-galli*, Linnæus, *Cratægus severa* differs in its usually acuminate leaves, with prominent primary veins, in the hairs along the upper side of the midribs of the young leaves, in the lighter colored anthers, larger subglobose fruit often broader than high, and in its stouter thorns.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXVII. CRATÆGUS SEVERA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer face, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS SEVERA, Sarg.

CRATÆGUS VILLIFLORA, SARG.

(Crus-galli.)

CRATÆGUS VILLIFLORA, *n. sp.*

Leaves obovate-cuneate, rounded or rarely acute at the apex, and coarsely doubly serrate above the middle, with straight glandular teeth; deeply tinged with red and covered with long white hairs when they unfold; more than half grown when the flowers open and then thin, yellow-green and setose above and pale and villose below on the midribs and veins, and at maturity subcoriaceous, dark green, lustrous and scabrate on the upper surface, on the lower surface scabrous and slightly villose along the slender yellow midribs and thin prominent primary veins, from 3.5 to 4 centimetres long and from 2.5 to 3 centimetres wide; petioles stout, narrowly wing-margined nearly to the base, villose while young, becoming glabrous, from 6 to 8 millimetres in length; leaves on vigorous shoots thicker, acute at the apex, and often from 4.5 to 5 centimetres long and from 2 to 2.2 centimetres wide, with foliaceous lunate coarsely serrate deciduous stipules. Flowers from 1.2 to 1.4 centimetres in diameter, on short slender densely villose pedicels, in compact hairy seven to fifteen, usually seven or eight-flowered, corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with matted pale hairs, the lobes wide, acute, slightly denticulate near the middle or nearly entire, glabrous on the outer surface, villose on the inner surface, reflexed after anthesis; stamens from five to ten, usually ten; anthers light yellow; styles two or three, surrounded at the base by a ring of yellowish hairs. Fruit on short nearly glabrous spreading or erect stems, in few-fruited clusters, short-oblong, full and rounded at the ends, green more or less deeply tinged with crimson, from 8 to 9 millimetres long and nearly as broad; calyx little enlarged, with a wide deep cavity, and small spreading and sometimes incurved persistent lobes; flesh thin, yellow-green, dry, and mealy; nutlets two or three, gradually narrowed to the rounded ends or acute at the apex, ridged on the back, with a high deeply grooved ridge, from 6.5 to 7 millimetres long and from 4 to 4.5 millimetres wide.

A tree, from 4 to 7 metres high, with a stem from 7 to 14 centimetres in diameter, horizontal branches forming a broad flat-topped head, and slender nearly straight branchlets dark orange-green and villose when they first appear, becoming light chestnut-red, marked by pale lenticels and pubescent or puberulous in their first season and dull gray-brown the following year, and armed with few stout straight spines usually from 1.2 to 2.5 centimetres long, but on vigorous shoots sometimes 3 centimetres in length. Flowers appear during the first week of May. Fruit ripens early in October.

On the gravelly banks of small streams near Grandin, Shannon County, Missouri, *B. F. Bush* (No. 11 type), May 18 and October 11, 1905, also 11 A, 11 B, and 11 C, May and October, 1905; Moark, Clay County, Arkansas, on the boundary between Missouri and Arkansas, *B. F. Bush* (No. 1), May 3 and October 16, 1905, (No. 1 A), May 2 and October 16, 1905, (No. 1 C, with fruit 1.2 centimetres in diameter), May 4 and October 17, 1905, (No. 1 D, also with larger fruit), October 16, 1905.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXVIII. CRATÆGUS VILLIFLORA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer face, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, dorsal view, enlarged.
7. A nutlet, ventral view, enlarged.

C. E. Faxon del.

CRATÆGUS VILLIFLORA, Sarg.

CRATÆGUS LIVONIANA, SARG.

(Crus-galli.)

CRATÆGUS LIVONIANA, *n. sp.*

Glabrous with the exception of the hairs on the upper surface of the young leaves and on the calyx-lobes. Leaves oblong-obovate, acute or rounded at the apex, gradually narrowed to the long slender concave-cuneate entire base, and finely often doubly serrate above, with straight or incurved glandular teeth; slightly tinged with red and villose, with scattered pale hairs, especially on the midribs, when they unfold, about half grown when the flowers open and then thin, yellow-green, and still slightly hairy above and pale yellow-green below, and at maturity subcoriaceous, dark yellow-green, very lustrous and glabrous on the upper surface, pale bluish green on the lower surface, from 5 to 6 centimetres long and from 3 to 4 centimetres wide, with stout midribs, and slender conspicuous primary veins extending very obliquely toward the apex of the leaf; petioles stout, wing-margined to below the middle, slightly villose on the upper side while young, soon becoming glabrous, often rose color in the autumn, from 1 to 1.2 centimetres in length; leaves on vigorous shoots coriaceous, rhombic to obovate or oval, short-pointed at the rounded apex, more coarsely serrate, occasionally slightly lobed above the middle, and often from 6 to 7 centimetres long and from 5 to 5.5 centimetres wide. Flowers from 2 to 2.2 centimetres in diameter, on long slender pedicels, in wide lax mostly ten to eighteen-flowered corymbs, the elongated lower peduncles from the axils of the upper leaves; calyx-tube broadly obconic, the lobes separated by wide sinuses, gradually narrowed from the base, long, slender, acuminate, conspicuously glandular-serrate, reflexed after anthesis; stamens twenty; anthers faintly tinged with pink before anthesis, becoming cream color; styles from two to four, surrounded at the base by a narrow ring of pale hairs. Fruit on long slender reddish pedicels, in drooping many-fruited clusters, subglobose to short-oblong, full and rounded at the ends, depressed at the insertion of the stalk, dark crimson, lustrous, marked by numerous large pale dots, from 1.2 to 1.4 centimetres in diameter; calyx prominent, with a wide deep cavity tomentose in the bottom, and long spreading coarsely glandular-serrate lobes slightly hairy on the upper side; flesh thick, dark orange color, sweet, dry, and mealy; nutlets from two to four, gradually narrowed to the rounded ends, or when two semi-orbicular, ridged on the back, with a high broad deeply grooved ridge, from 7 to 7.5 millimetres long and about 5 millimetres wide.

A tree, from 6 to 7 metres high, with a trunk 2 to 3 decimetres in diameter, covered with dark gray scaly bark, large erect and spreading branches, and stout slightly zigzag drooping branchlets dark orange-green and marked by pale lenticels when they first appear, becoming light orange-brown and lustrous in their first season and pale gray-brown the following year, and armed with numerous stout nearly straight light chestnut-colored ultimately purplish shining spines from 5.5 to 6 centimetres long. Flowers appear late in May. Fruit ripens the middle of October.

Bank of the outlet of Hemlock Lake near Hemlock Lake Station in Livonia Township, Livingston County, New York, *Henry T. Brown* (No. 8 type), May 28 and October 16, 1906, October 3, 1907.

Cratægus livoniana, with its large and lustrous leaves, with flowers unusually large in this group, and great clusters of shining fruits hanging on long stalks, is one of the most beautiful and conspicuous of the arborescent Thorns of the northern states.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CXXIX. Cratægus livoniana.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer face, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit showing the nutlets.
6. Vertical section of a fruit showing the nutlets and calyx.
7. A nutlet, ventral view.
8. A nutlet, dorsal view.

C. E. Faxon del.

CRATÆGUS LIVONIANA, Sarg.

CRATÆGUS LANCEOLATA, SARG.

(ViridES.)

CRATÆGUS LANCEOLATA, *n. sp.*

Glabrous with the exception of the hairs on the young leaves and petioles. Leaves lanceolate, gradually narrowed and concave-cuneate at the entire base, and crenulate-serrate usually only above the middle; nearly full grown when the flowers open, and then thin, yellow-green, sparingly villose along the midribs above and paler and furnished below with small tufts of axillary hairs, and at maturity thin but firm in texture, yellow-green, smooth, glabrous, and lustrous on the upper surface, pale and nearly glabrous on the lower surface, from 4.5 to 5.5 centimetres long and from 2.5 to 3 centimetres wide, with slender midribs often rose color in the autumn, and thin obscure primary veins; petioles slender, slightly wing-margined at the apex, sparingly villose while young, soon glabrous, often rose color in the autumn, from 1.2 to 2 centimetres in length; leaves on vigorous shoots thicker, oblong-ovate, long-pointed and acuminate at the apex, gradually narrowed and concave-cuneate at the base, coarsely glandular-serrate, deeply divided into three or four pairs of broad acuminate lateral lobes, from 7 to 9 centimetres long and from 5.5 to 6.5 centimetres wide, with long broadly winged petioles, and slender foliaceous lunate coarsely glandular-serrate persistent stipules. Flowers from 1.5 to 1.7 centimetres in diameter, on very long slender pedicels, in wide lax mostly ten to twelve-flowered corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes slender, acuminate, entire, reflexed after anthesis; stamens twenty; anthers pale yellow; styles four or five. Fruit on slender elongated drooping stems, in many-fruited clusters, short-oblong to slightly obovate, gradually narrowed and rounded at the ends, orange-red, lustrous, marked by occasional large dark dots, from 7 to 8 millimetres long and from 6 to 7 millimetres in diameter; calyx little enlarged, with a short tube, a deep narrow cavity, and usually persistent lobes abruptly narrowed from broad bases, slender, erect and incurved, and dark red on the upper side below the middle; flesh thin, light yellow, soft, and mealy; nutlets four or five, acute at the base, narrowed and rounded at the apex, rounded and slightly grooved or irregularly ridged on the back, with a low thin ridge, about 5 millimetres long and from 2.5 to 3 millimetres wide.

A tree, from 8 to 10 metres high, with a fluted trunk from 1 to 1.5 decimetres in diameter, covered with light gray scaly bark, the narrow scales in separating disclosing the orange-colored inner bark, large spreading ascending branches drooping at the ends and forming a wide open handsome head, and slender nearly straight branchlets dark green tinged with red and marked by large pale lenticels when they first appear, becoming orange-red and lustrous in their first season and pale gray-brown the following year, and usually unarmed. Flowers appear during the first week of May. Fruit ripens late in October or early in November. In the autumn the leaves turn dark orange color before falling.

Bottom-lands of the Despères River at Carondelet, South St. Louis, Missouri, *J. H. Kellogg* (No. 4 type), May 6 and November 4, 1902.

This handsome species is well distinguished from the related *Cratægus viridis*, Linnæus, by its thicker lanceolate, not ovate or obovate, leaves, by the much longer pedicels of the flowers, and by the orange-red, not scarlet, fruit, and scaly bark.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXX. CRATÆGUS LANCEOLATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer face, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS LANCEOLATA, Sarg.

CRATÆGUS ASPERA, SARG.

(Pruinosæ.)

CRATÆGUS ASPERA, *n. sp.*

Leaves oblong-ovate, acuminate, rounded or abruptly cuneate at the entire base, sharply doubly serrate above, with straight glandular teeth, and deeply divided into three or four pairs of accuminate spreading lateral lobes; about one third grown when the flowers open and then thin, dark yellow-green and setose above and pale and villose below, especially on the midribs and veins, and at maturity thin, yellow-green and scabrous on the upper surface, pale and scabrous on the lower surface, from 5.5 to 6.5 centimetres long and from 4 to 6.5 centimetres wide, with slender orange-colored villose midribs and veins; petioles slender, slightly wing-margined at the apex, villose, occasionally glandular, from 2.5 to 3.5 centimetres in length. Flowers from 1.7 to 1.8 centimetres in diameter, on long slender villose pedicels, in crowded compact mostly five to seven-flowered corymbs, with linear-obovate to linear glandular bracts and bractlets often persistent until the flowers open, the stout lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, acuminate, entire, occasionally minutely dentate, glabrous, reflexed after anthesis; stamens twenty; anthers rose color; styles from three to five, surrounded at the base by a narrow ring of yellow tomentum. Fruit on long slender spreading or drooping hairy stems, in few-fruited clusters, short-oblong to subglobose, scarlet, very pruinose, from 1 to 1.2 centimetres in diameter; calyx little enlarged, with a wide deep cavity, and spreading often deciduous lobes; flesh thin, yellow-green, dry, and hard; nutlets usually four or five, thin, rounded at the ends, rounded and grooved or slightly ridged on the back, from 5.5 to 6 millimetres long and from 4 to 4.5 millimetres wide.

A shrub, from 1 to 2 metres high, with stout stems, and slender zigzag branchlets dark orange-green and slightly villose when they first appear, becoming glabrous, bright chestnut-brown, very lustrous, and marked by small pale lenticels in their first season, and dull gray-brown the following year, and armed with numerous stout or slender slightly curved chestnut-brown shining spines from 4 to 6.5 centimetres long. Flowers appear early in May. Fruit ripens late in November. The leaves turn deep wine color in the autumn before falling.

Bottom-lands of Baker's Branch, two miles south of Webb City, Jasper County, Missouri, *E. J. Palmer* and *C. S. Sargent* (No. 15 type), October 2, 1901, *E. J. Palmer*, November 3, 1901, May 4, 1902.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CXXXI. Cratægus aspera.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS ASPERA, Sarg.

CRATÆGUS MAGNIFOLIA, SARG.

(Pruinosæ.)

CRATÆGUS MAGNIFOLIA, *n. sp.*

Glabrous with the exception of a few hairs in the axils of the veins. Leaves broadly ovate, short-pointed and acute at the apex, abruptly concave-cuneate or rounded at the entire base, coarsely doubly serrate above, with straight glandular teeth, and very slightly lobed; nearly half grown when the flowers open and then thin and yellow-green, and at maturity thin, blue-green, paler on the lower than on the upper surface, from 6 to 7.5 centimetres long and from 5 to 6.5 centimetres wide, with slender yellow midribs, and thin primary veins arching obliquely to the point of the lobes; petioles slender, slightly wing-margined at the apex, from 3 to 4 centimetres in length. Flowers from 1.6 to 1.8 centimetres in diameter, on slender pedicels, in small very compact from four to ten, usually six or seven-flowered corymbs, with linear glandular-serrate bracts and bractlets fading brown and often persistent until the flowers open, the short lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, acuminate, often entire or occasionally minutely dentate, reflexed after anthesis; stamens twenty; anthers pale yellow; styles three or four, surrounded at the base by a broad ring of pale tomentum. Fruit on short erect or spreading stems, in few-fruited clusters, subglobose, five-angled at the base, gradually narrowed and rounded at the apex, green, or dull red, with dark blotches when fully ripe, and about 1.5 centimetres in diameter; calyx prominent, with a wide shallow cavity, and spreading lobes deciduous from the ripe fruit; flesh thin, green, dry, and hard; nutlets from two to five, usually three or four, narrowed and acute at the ends, or when two rounded at the base, irregularly ridged on the back, with a high narrow or a broad and deeply grooved ridge, from 6.5 to 7 millimetres long and from 4 to 4.5 millimetres wide.

An arborescent shrub, from 3 to 4 metres high, with small intricately branched stems covered with pale scaly bark, small ascending branches forming a narrow irregular head, and very slender nearly straight branchlets light orange-green when they first appear, becoming light chestnut-brown or olive-brown and marked by pale dots in their first season, and dark red-brown the following year, and armed with occasional very slender nearly straight purplish shining spines from 2 to 3 centimetres long. Flowers appear at the end of April. Fruit ripens in October.

Thickets near Webb City, Jasper County, Missouri, *E. J. Palmer* (No. 26 type), April 30 and September 25, 1905.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXXII. CRATÆGUS MAGNIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, lateral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS MAGNIFOLIA, Sarg.

CRATÆGUS PROCERA, SARG.

(Pruinosæ.)

CRATÆGUS PROCERA, *n. sp.*

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves ovate, acuminate, rounded or abruptly cuneate at the broad entire base, finely often doubly serrate above, with straight or incurved glandular teeth, and slightly divided into five or six pairs of small acuminate spreading lobes; about half grown when the flowers open and then very thin, dark yellow-green, lustrous, and slightly hairy along the midribs above and pale below, and at maturity thin but firm in texture, dark blue-green and lustrous on the upper surface, pale bluish green on the lower surface, from 5 to 5.6 centimetres long and from 4 to 5 centimetres wide, with slender midribs and thin obscure primary veins; petioles slender, slightly wing-margined at the apex, glandular while young, with mostly deciduous glands, from 2.5 to 3 centimetres in length; leaves on vigorous shoots broadly ovate, often cordate at the base, more coarsely serrate, more deeply lobed, and frequently 7 to 8 centimetres long and wide. Flowers from 2 to 2.2 centimetres in diameter, on long slender pedicels, in small mostly five or six-flowered corymbs, the elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, the lobes gradually narrowed from wide bases, short, slender, acuminate, minutely and irregularly glandular-serrate usually only above the middle, more or less tinged with rose color, reflexed after anthesis; stamens ten; anthers pale pink; styles three or four, surrounded at the base by a ring of long white hairs. Fruit on long stout spreading or erect pedicels, in few-fruited clusters, crimson, slightly pruinose, becoming lustrous, marked by large pale dots, subglobose but often rather broader than high, from 1.2 to 1.4 centimetres in diameter, depressed at the insertion of the stalk; calyx prominent, with a broad deep cavity gradually narrowed downward, pointed and tomentose in the bottom, and small spreading and slightly incurved lobes dark red on the upper side; flesh thin, sweet, rather juicy, blood red when fully ripe; nutlets three or four, gradually narrowed to the rounded or acute ends, rounded and grooved or slightly ridged on the back, from 6 to 6.5 millimetres long and about 4 millimetres wide.

A tree up to 7 metres high, with a trunk sometimes 3.7 decimetres in diameter, with gray scaly bark, long wide-spreading purplish branches, the lower drooping, the upper ascending and forming a broad round-topped rather open head, and slender nearly straight branchlets light orange-green and marked by pale lenticels when they first appear, becoming light chestnut-brown and very lustrous in their first season and dull gray-brown the following year, and armed with slender straight or slightly curved orange-brown or dark purple shining spines from 2 to 2.5 centimetres long. Flowers appear during the last week of May. Fruit ripens from the middle to the end of October.

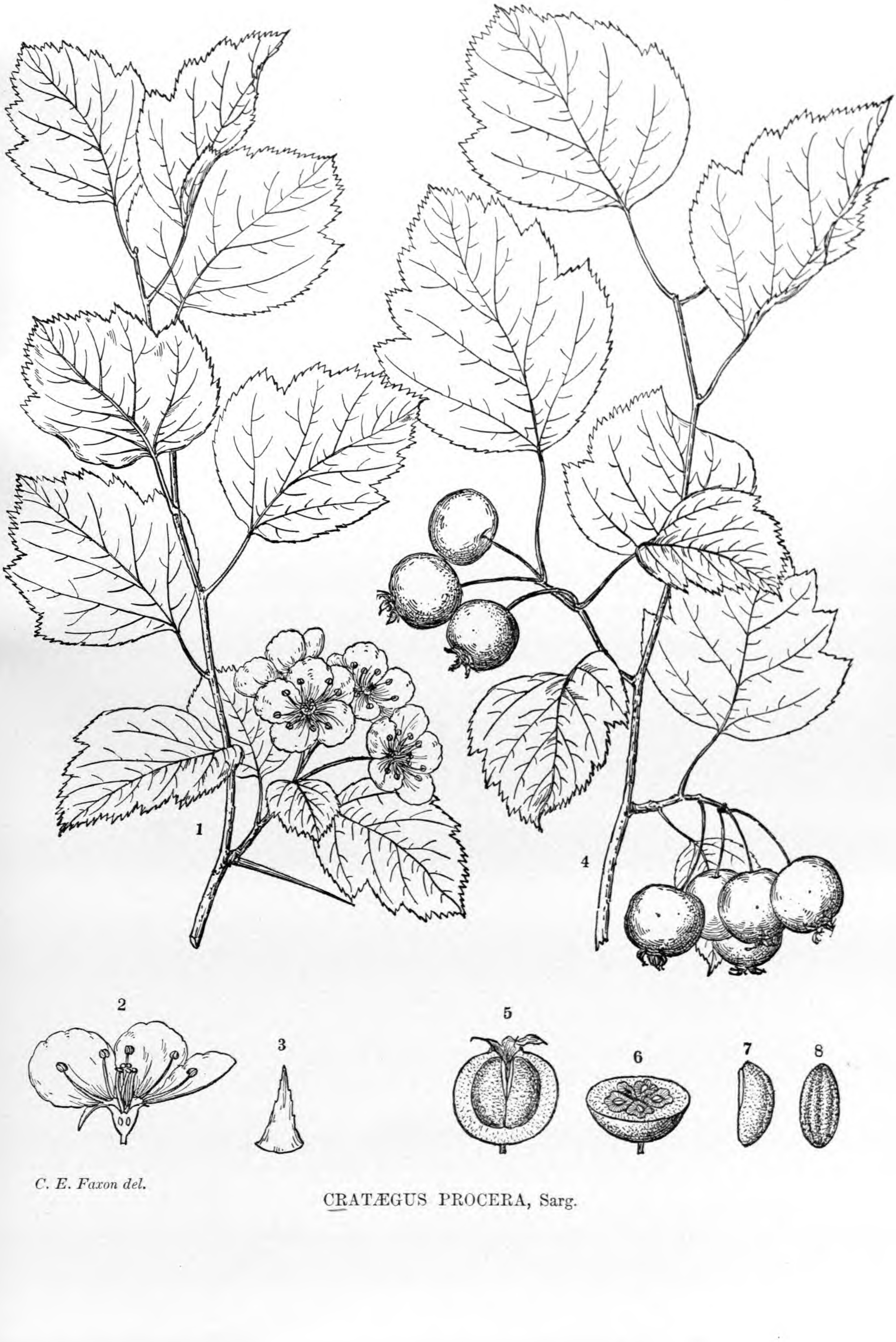
Flats north of Hemlock Lake, Livingston County, New York, *Henry T. Brown* (No. 29 type), May 22 and October 16, 1906.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXXIII. CRATÆGUS PROCERA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit showing nutlets and calyx, enlarged.
6. Cross section of a fruit, enlarged.
7. A nutlet, lateral view, enlarged.
8. A nutlet, dorsal view, enlarged.



C. E. Faxon del.

CRATÆGUS PROCERA, Sarg.

CRATÆGUS KENNEDYI, SARG.

(Coccineæ.)

CRATÆGUS KENNEDYI, *n. sp.*

Leaves ovate, acuminate, gradually or abruptly narrowed to the cuneate entire base, sharply doubly serrate above, with straight glandular teeth, and divided above the middle into four or five pairs of slender acuminate spreading lobes; more than half grown when the flowers open and then thin, light yellow-green and setose above and pale and glabrous below, and at maturity thin, glabrous, dark green and lustrous on the upper surface, light yellow-green on the lower surface, from 5 to 7 centimetres long and from 4 to 5.6 centimetres wide, with slender midribs, and thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, glabrous, glandular, with minute sometimes persistent glands, from 2 to 3.5 centimetres in length. Flowers on long slender slightly villose pedicels, in mostly five to seven-flowered lax corymbs, the lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes slender, elongated, acuminate, minutely glandular-serrate, glabrous on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens ten; anthers rose purple; styles three or four. Fruit on long slender glabrous pedicels, in few-fruited drooping clusters, slender-obovate, gradually narrowed to the base, rounded and slightly narrowed at the apex, crimson, lustrous, from 1.1 to 1.2 centimetres long and from 7 to 8 millimetres in diameter; calyx prominent, with a wide shallow cavity, and spreading often incurved lobes, their tips generally deciduous from the ripe fruit; flesh thin, yellow, dry, and mealy; nutlets three or four, acute at the rounded base, narrowed and acute at the apex, ridged on the back, with a broad slightly grooved ridge, from 6 to 7 millimetres long and from 4 to 5 millimetres wide.

A broad rounded-topped shrub, from 4 to 5 metres high, with numerous large stems spreading into thickets, and stout glabrous branchlets, light orange color when they first appear, becoming light chestnut-brown, very lustrous and marked by pale lenticels in their first season and dull gray-brown the following year, and armed with stout nearly straight light chestnut-brown ultimately dull gray spines from 2.5 to 5 centimetres long. Flowers appear about the middle of June. Fruit ripens at the end of August or early in September.

Rocky summit of Willoughby Mountain, Orleans County, Vermont, at an altitude of about 850 metres, *E. Faxon*, July 23, 1886, *J. G. Jack*, August 23, 1901, *W. W. Eggleston*, September 13, 1903, *G. G. Kennedy*, June 18, 1906.

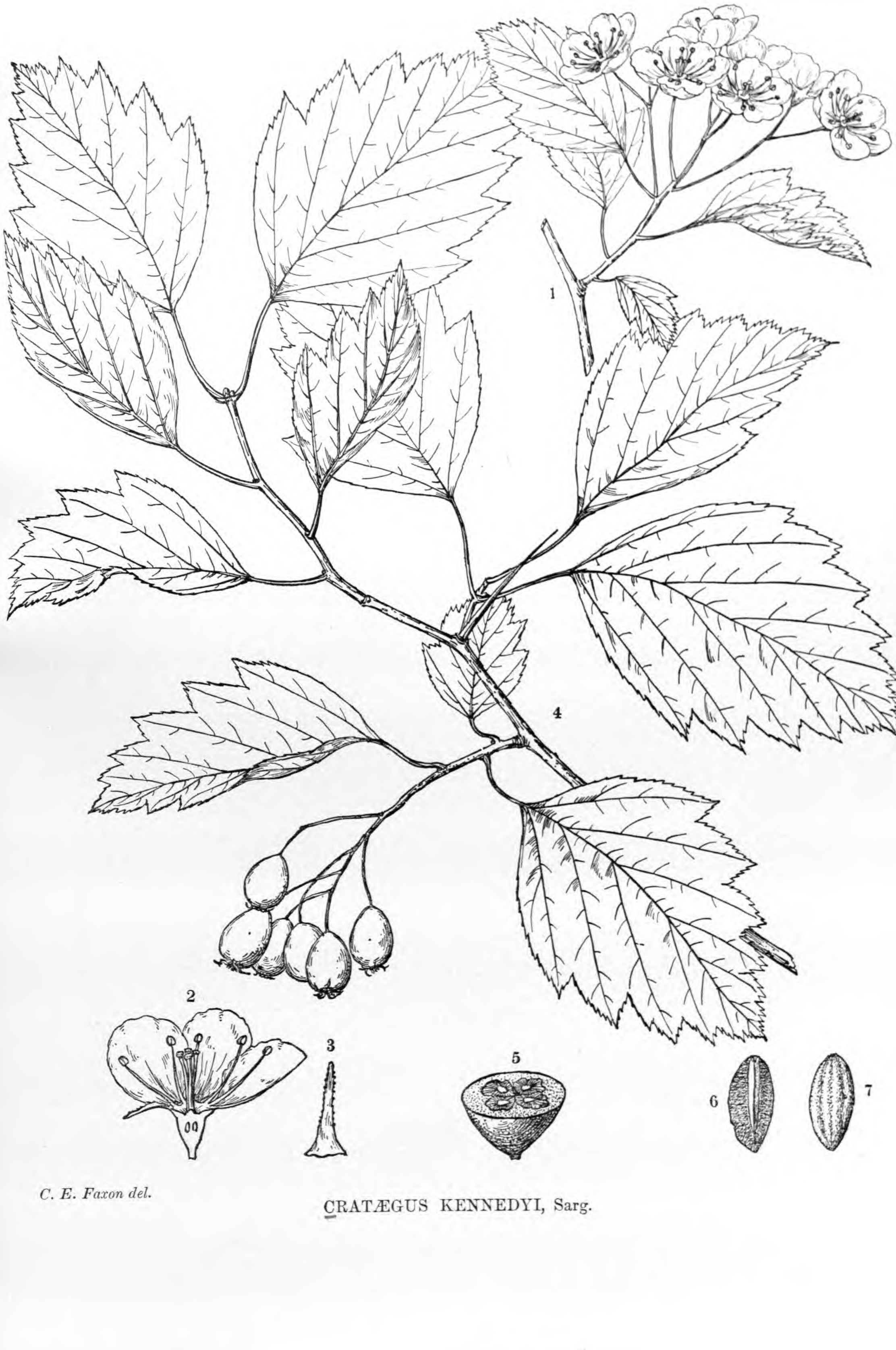
This interesting species is named for Dr. George G. Kennedy, a student of the New England flora and the author of the *Flora of Willoughby*. Of the small group of the *Coccineæ* with ten stamens and rose-colored anthers it is most closely related to *Cratægus Fernaldi*, Sargent, of the Aroostook valley in Maine, which differs from it in its more deeply lobed leaves, villose below especially while young, more hairy pedicels, tomentose calyx-tubes, more broadly obovate fruit, obtuse nutlets, and larger and stouter spines.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXXIV. CRATÆGUS KENNEDYI.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.



C. E. Faxon del.

CRATÆGUS KENNEDYI, Sarg.

CRATÆGUS PADIFOLIA, SARG.

(Intricatæ.)

CRATÆGUS PADIFOLIA, *n. sp.*

Glabrous with the exception of a few caducous hairs on the upper surface of the unfolding leaves. Leaves oval to ovate or rarely obovate, acuminate, gradually or abruptly narrowed to the cuneate entire or glandular base, sharply doubly serrate, with broad straight or incurved glandular teeth, and rarely slightly three-lobed toward the apex; deeply tinged with red when they unfold, still more or less red, very smooth above and about half grown when the flowers open, and at maturity thin, light yellow-green on the upper surface, pale on the lower surface, from 5.5 to 7 centimetres long and from 4 to 5 centimetres wide, with stout yellow midribs, and four or five pairs of slender primary veins. Flowers 1.8 centimetres in diameter, on short erect pedicels, in compact mostly five-flowered corymbs, with conspicuous obovate to lanceolate glandular bracts and bractlets fading rose color; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, acuminate, glandular, with minute dark red scattered glands, reflexed after anthesis; stamens ten; anthers yellowish white, faintly tinged with rose color; styles two or three, surrounded at the base by a broad ring of white hairs. Fruit on stout erect or spreading pedicels, in one to three-fruited clusters, short-oblong or sometimes slightly broader than high, often slightly angled, full and rounded at the ends, dull orange-red marked by small dark dots, from 1.2 to 1.5 centimetres in diameter; calyx little enlarged, with a wide deep cavity, and small spreading lobes mostly deciduous from the ripe fruit; flesh thin, yellow, hard, and dry; nutlets two or three, broad and rounded at the apex, gradually narrowed at the base or obtuse at the ends, ridged on the back, with a broad high slightly grooved ridge, from 5.5 to 6 millimetres long and from 3 to 3.5 millimetres wide.

An arborescent shrub, from 4 to 6 metres high, with small stems covered with dark scaly bark, small erect and slightly spreading branches forming an open head, and slender nearly straight branchlets, green tinged with red when they first appear, becoming light chestnut-red, lustrous, and marked by large pale lenticels in their first season, and dull gray-brown the following year, and armed with slender straight or slightly curved purple shining ultimately ashy gray spines from 2.5 to 3 centimetres long. Flowers appear from the 20th to the end of April. Fruit ripens from the middle to the end of September and often remains on the branches after the leaves have fallen.

Upland woods near Swan, Taney County, Missouri, *B. F. Bush* (No. 5), May 19 and September 23, 1905, (5 A) September 23, 1905, (5 B type) September 27, 1905, April 23, 1907, (5 C, 5 D, 5 F, 5 I, 5 J, and 5 K) April 21–25, 1907, also Nos. 149 and 152, June 2, 1899.

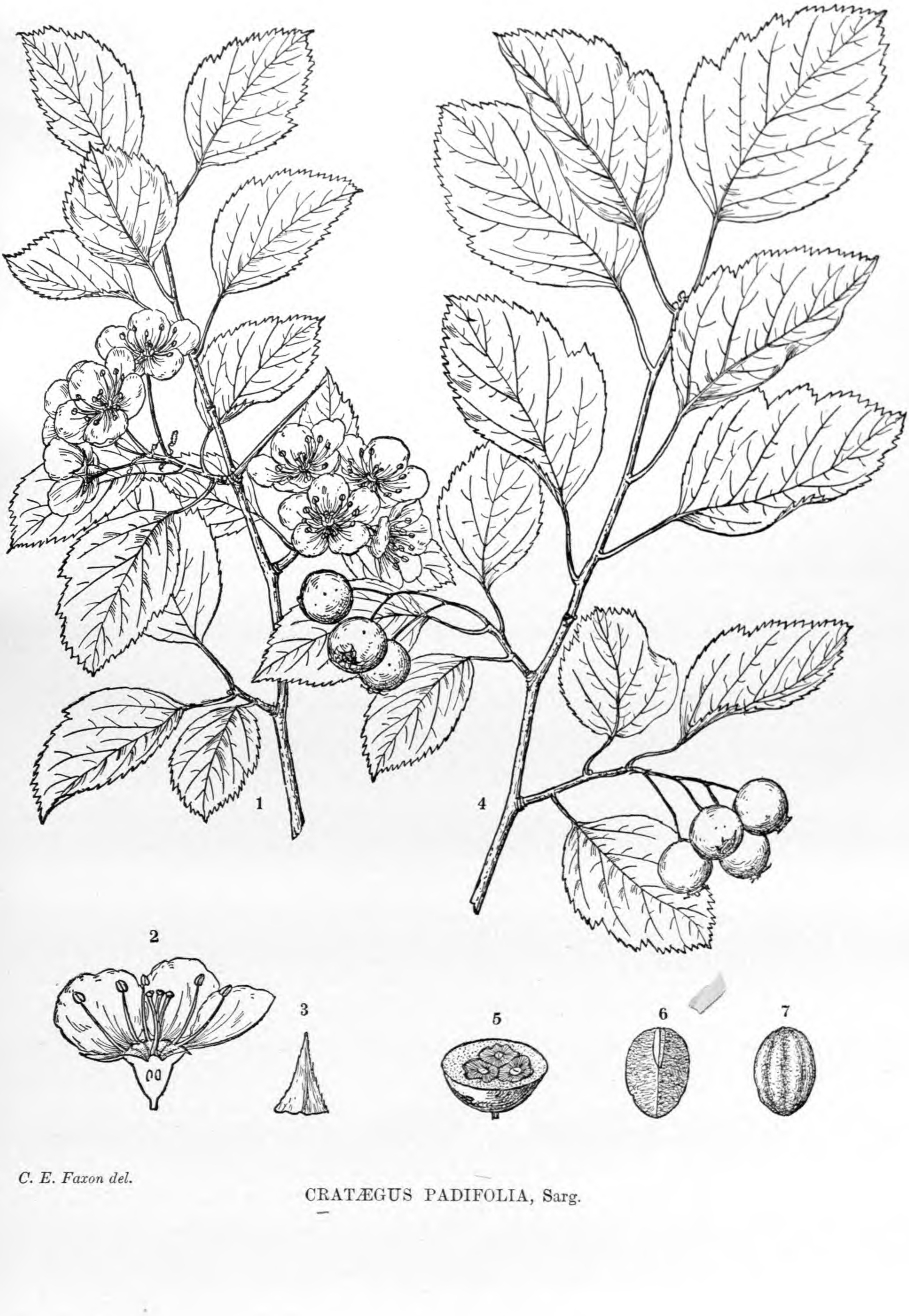
This species is doubtfully referred to the Intricatæ because, although it differs from the described species in that group in some important respects, it seems more nearly related to them than it does to the species of the other established groups. *Cratægus padifolia* is unlike all the other species of Cratægus I have seen in the form of the leaves, which, although more finely serrate, resemble in a remarkable degree those of a Padus.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXXV. CRATÆGUS PADIFOLIA.

1. A flowering branch, natural size.
2. A flower, vertical section, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.



C. E. Faxon del.

CRATÆGUS PADIFOLIA, Sarg.

CRATÆGUS MOLLITA, SARG.

(Tomentosæ.)

CRATÆGUS MOLLITA, *n. sp.*

Leaves ovate to oval or slightly obovate, acuminate, gradually or abruptly narrowed and concave-cuneate at the entire base, coarsely doubly serrate above, with straight glandular teeth, and slightly divided above the middle into three or four pairs of small acuminate spreading lobes; nearly full grown when the flowers open and then thin, dark yellow-green and covered above by short white hairs most abundant along the midribs, and pale and villose below, and at maturity thin, yellow-green, lustrous and glabrous on the upper surface, light yellow-green and still villose on the lower surface, from 7 to 8 centimetres long and from 4.5 to 6 centimetres wide, with slender midribs, and thin primary veins extending obliquely to the points of the lobes; petioles slender, narrowly wing-margined often to below the middle, densely pubescent early in the season, becoming almost glabrous, often rose color in the autumn, from 8 to 10 millimetres in length; leaves on vigorous shoots rather thicker, coarsely serrate, and often from 9 to 10 centimetres long and from 6.5 to 8.5 centimetres wide. Flowers 1 centimetre in diameter, on short stout densely villose pedicels, in wide mostly eighteen to twenty-five-flowered corymbs, the long stout villose lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, thickly coated with long matted white hairs, the lobes long, abruptly narrowed from broad bases, wide, acuminate, glandular-serrate, glabrous on the outer surface, villose on the inner surface, reflexed after anthesis; stamens from five to eight, usually five or six; anthers pale rose color; styles two or three, surrounded at the base by a ring of long white hairs. Fruit on stout spreading glabrous reddish stems, in many-fruited clusters, subglobose to short-oblong, orange-red, lustrous, marked by large pale dots; calyx little enlarged, with a narrow deep cavity, and small spreading or incurved generally persistent lobes; flesh thick, yellow, soft, and succulent; nutlets two or three, full and rounded at the ends, ridged on the back, with a broad low slightly grooved ridge, irregularly penetrated on the inner faces by broad deep cavities, from 6.5 to 7 millimetres long and from 4 to 4.5 millimetres wide.

A tree, from 5 to 8 metres high, with a slender trunk, small spreading branches forming a narrow open head, and slender nearly straight branchlets covered when they first appear with matted pale hairs, becoming dark orange color, verrucose and puberulous in their first season and ashy gray the following year, and unarmed or armed with nearly straight slender ashy gray spines from 2.5 to 3 centimetres in length. Flowers from the 20th to the end of May. Fruit ripens the end of September.

Gravelly banks of streams at Swan, Taney County, Missouri, *B. F. Bush* (No. 11 B type), May 24 and September 27, 1905, (Nos. 11, 11 A, 11 C, and 11 D) May and September, 1905.

One of the thin-leaved Tomentosæ species, *Cratægus mollita* differs chiefly from *Cratægus mollicula*, Sargent, from Shannon County, Missouri, of this group, in its smaller number of stamens and rose-colored anthers.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXXXVI. CRATÆGUS MOLLITA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, outer view, enlarged.
4. A fruiting branch, natural size.
5. Cross section of a fruit, enlarged.
6. A nutlet, ventral view, enlarged.
7. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS MOLLITA, Sarg.

PTEROCARYA REHDERIANA, C. K. SCHNEID.

(Pterocarya fraxinifolia × stenoptera.)

PTEROCARYA REHDERIANA (*stenoptera* × *fraxinifolia*), C. K. Schneider, *Ill. Handb. Laubholzk.* i. 93 (1904).

PTEROCARYA STENOPTERA, Rehder, *Bailey Cycl. Am. Hort.* iii. f. 3013 (not C. De Candolle) (1901).

PTEROCARYA FRAXINIFOLIA × STENOPTERA, Rehder, *Mitt. Deutsch. Dendr. Ges.* xii. 116 (1903).

Leaves imparipinnate, from 25 to 35 centimetres long, with puberulous petioles from 4 to 5 centimetres in length; rhachis sparingly glandular and hairy or nearly glabrous, narrowly winged between the upper leaflets, particularly on vigorous branches; leaflets from eleven to twenty-one, sessile, narrow-oblong to oblong-lanceolate, acute or acuminate, very oblique at the base, crenate-serrate, with glandular-tipped teeth, glabrous, dark yellowish green on the upper surface, lighter green on the lower surface, sparingly pubescent while young, at maturity glabrous with the exception of the axillary tufts of brown hairs, from 6 to 14 centimetres long, the lower ones the smallest, the terminal leaflet slender-petioluled, oblong-obovate, cuneate at the base. Flowers monœcious; staminate flowers in short-peduncled or nearly sessile catkins from 5 to 7 centimetres in length and originating from lateral axillary naked buds near the ends of the branchlets of the previous year; flowers sessile, glandular, and sparingly villous; the bract and the two bractlets connate, free at the apex, the upper sepal always conspicuous, the lower sepals often minute or wanting; stamens from eight to ten, with very short filaments and oval-oblong anthers; pistillate flowers in many-flowered slender pendulous and long-stalked racemes from 15 to 20 centimetres in length and terminal on the branchlets of the year; flowers sessile, remote, each flower subtended by a small subulate bract shorter than and adnate to the two lateral oval bractlets connate to the middle with the perianth; perianth divided above the middle into four lanceolate teeth exceeding the bractlets, the whole covered with minute yellow glands; style with two oblong-ovate recurved stigmata. Fruit winged, subglobose, with a conical apex, about 1 centimetre long, the wings spreading, elliptic to oblong-ovate, from 10 to 15 millimetres long and from 6 to 7 millimetres broad.

A tree, usually with several ascending stems, covered with light gray bark divided by shallow longitudinal fissures into narrow ridges broken into small thin plates, and branchlets glandular and slightly villous while young, soon glabrous, becoming greenish brown during the first season and brown and lustrous in their second year. Winter-buds naked, the axillary usually superposed in pairs; the upper one long-stalked. Flowers proterandrous, appearing in May with the leaves. Fruits ripen in September. Leaves fall without change of color after the first frost.

There is little doubt that this handsome tree is a hybrid between *Pterocarya fraxinifolia*, Spach, and *Pterocarya stenoptera*, C. De Candolle. It originated from seeds of *Pterocarya stenoptera*, and in all its characters it is intermediate between the two species. From *Pterocarya fraxinifolia* it chiefly differs in its narrowly winged rhachis usually sparingly villous while young, the narrower less distinctly acuminate leaflets, and the narrower and longer wings of the fruits; from *Pterocarya stenoptera* it differs in its more coarsely serrate acute and larger leaflets, with the axils of the veins bearded beneath, in the narrow, not serrate, wings of the rhachis, the wings being usually absent between the lower leaflets, and in the shorter and broader wings of the fruits.

The trees of *Pterocarya Rehderiana* at the Arnold Arboretum were raised from seeds received in 1879 and 1880

from the Arboretum Segrezianum as *Pterocarya stenoptera;* they are now about 12 metres high and have proved to be much hardier and more satisfactory than either of their supposed parents. In the most severe winters the trees in the Arboretum have suffered only slightly, while *Pterocarya stenoptera* is much injured every winter even in the most favorable situations, and young plants of *Pterocarya fraxinifolia* are quite tender. *Pterocarya Rehderiana* may therefore be planted in regions where the other Pterocaryas are liable to suffer in winter, It can be easily propagated by suckers, which spring up in large numbers from the roots of the old trees.

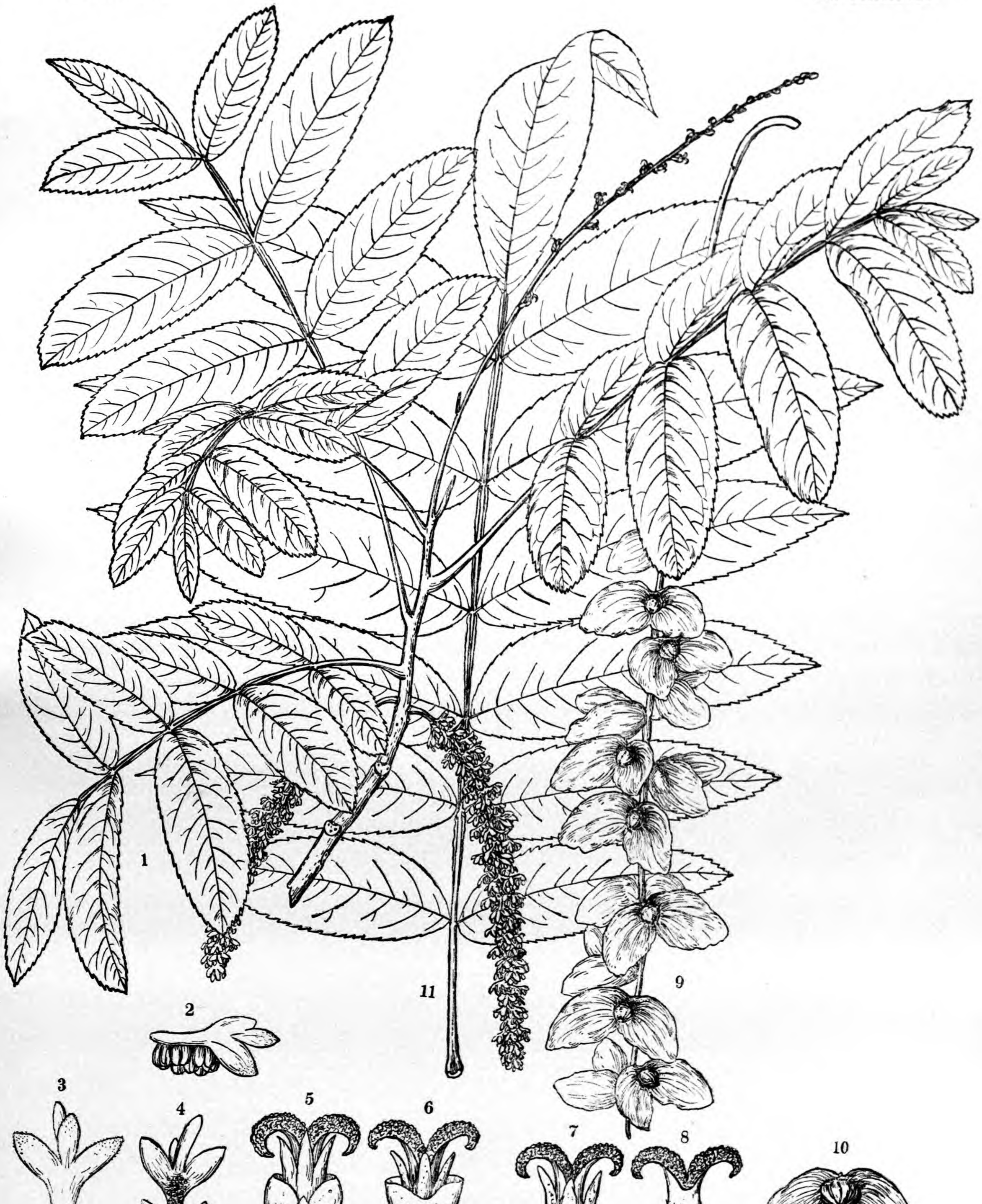
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXXVII. PTEROCARYA REHDERIANA.

1. A flowering branch, natural size.
2. A staminate flower, side view, enlarged.
3. A staminate flower with undeveloped lateral sepals, seen from above, enlarged.
4. A staminate flower with lateral sepals developed, seen from below, the stamens removed, enlarged.
5. A pistillate flower, anterior view, enlarged.
6. A pistillate flower, posterior view, enlarged.
7. A pistillate flower with the bracts removed, enlarged.
8. A pistil, enlarged.
9. A fruiting raceme, natural size.
10. A fruit, natural size.
11. A leaf, natural size.



C. E. Faxon del.

PTEROCARYA REHDERIANA, C. K. Schneid.

VIBURNUM CORDIFOLIUM, WALL.

VIBURNUM CORDIFOLIUM, Wallich ex De Candolle, *Prodr.* iv. 327 (1830). — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 175. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 6. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, viii. 252; *Pl. David.* i. 69. — Gräbner, *Engler Bot. Jahrb.* xxix. 587. — Brandis, *Indian Forest Trees*, 361.

Leaves deciduous, ovate to broadly ovate, rarely oblong-ovate, acuminate, cordate or rounded at the base, unequally serrate, yellowish green and glabrous or nearly so on the upper surface, lighter green and sparingly stellate-lepidote, particularly on the veins, on the lower surface, from 10 to 18 centimetres long and from 5 to 16 centimetres broad, with from eight to ten pairs of veins impressed above, elevated beneath and connected by prominent transverse veinlets; petioles stout, slightly grooved, from 2.5 to 5.5 centimetres in length, stellate-lepidote while young, much enlarged at the base, and usually furnished with two short stipules. Corymbs terminal, sessile, flat, from 5 to 15 centimetres in diameter, sparingly stellate-lepidote; rays usually seven; flowers on rays of the third order; ovary cylindric, glabrous, 1.5 millimetres long; calyx-lobes ovate, hairy, with a few stellate hairs; corolla rotate, from 6 to 10 millimetres in diameter, the lobes twice as long as the tube, ovate-oblong to oblong, usually of unequal size, the outer somewhat longer than the others, particularly in the marginal flowers; stamens about half as long as the corolla; filaments little more than 1 millimetre in length; anthers broadly oval, purple; style thick, conical, slightly exceeding the calyx-lobes. Drupe purple, ovoid, crowned by the persistent calyx-lobes, 8 millimetres long and from 6 to 7 millimetres thick; stone compressed, with a deep ventral furrow, T-shaped in the cross section by its inflexed edges, and with a shallow dorsal groove; seed covered with red resinous glands; albumen ruminate.

A loosely branched shrub or a small tree, with sparingly stellate-lepidote branchlets, becoming gray or grayish brown and marked by a few large lenticels. Winter-buds naked. Flowers appearing with the leaves.

China: Szech'uan, altitude 3300 metres, *E. H. Wilson* (No. 3735); also on the Himalayas from Kumaon to Bhotan.

Viburnum cordifolium is easily distinguished by the absence of radiant flowers from the allied species, *Viburnum sympodiale*, Gräbner, *Viburnum furcatum*, Blume, and *Viburnum alnifolium*, Marshall, which it closely resembles in foliage and habit.

ALFRED REHDER.

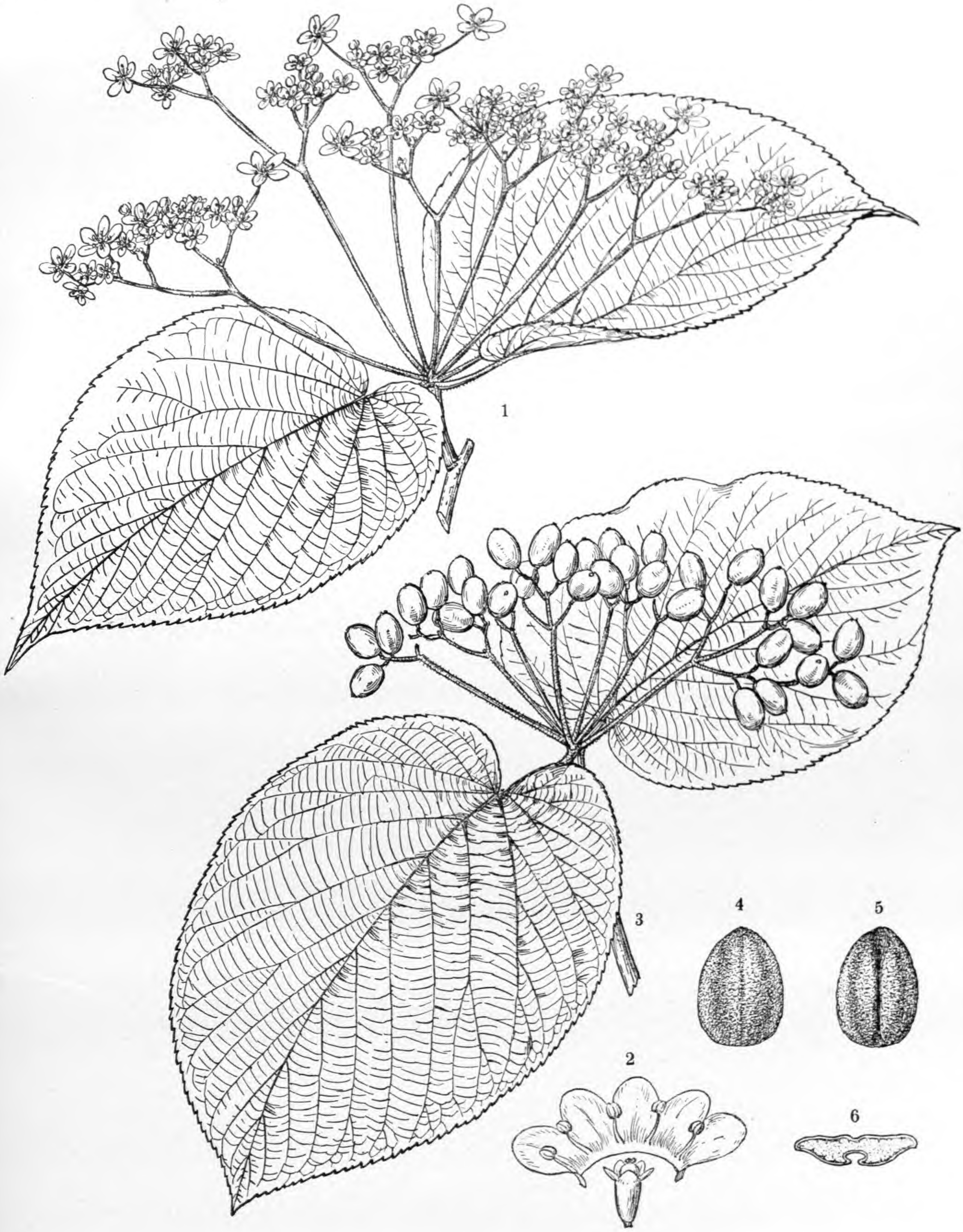
Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXXVIII. VIBURNUM CORDIFOLIUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.

Figures 1 to 3 of this plate were made from Wilson's specimens, and figures 4 to 6 from a Himalayan specimen collected by J. D. Hooker and preserved in the Gray Herbarium.



C. E. Faxon del.

VIBURNUM CORDIFOLIUM, Wall.

VIBURNUM SYMPODIALE, GRÄBN.

VIBURNUM SYMPODIALE, Gräbner, *Engler Bot. Jahrb.* xxix. 587 (1901).
VIBURNUM FURCATUM, Hemsley, *Jour. Linn. Soc.* xxiii. 352 (excl syn.) (not Blume) (1888).

Leaves deciduous, ovate to elliptic-ovate, acuminate, rounded or subcordate at the base, serrulate, yellowish green and glabrous on the upper surface, lighter green and sparingly stellate-lepidote on the veins and veinlets on the lower surface, from 7 to 13 centimetres long and from 4 to 8 centimetres broad, with from six to eight pairs of veins slightly impressed above, elevated beneath and connected by conspicuous transverse veinlets; petioles rather slender, grooved, stellate-lepidote, from 1.5 to 3 centimetres in length, furnished near the base with slender stipules about 5 millimetres long. Corymbs terminal, sessile, flat, from 6 to 9 centimetres in diameter, sparingly stellate-lepidote, becoming nearly glabrous at maturity, with large sterile radiant flowers; rays usually five; flowers sessile on rays of the third order; ovary glabrous, nearly cylindric, 2 millimetres long; calyx-lobes orbicular-ovate, stellate-pubescent on the outer surface; corolla rotate, glabrous, about 5 millimetres in diameter, its lobes ovate, about twice as long as the tube; stamens scarcely half as long as the corolla; anthers broadly oval, yellow; style conical, short, scarcely longer than the calyx-lobes. Sterile flowers about 2.5 centimetres broad, with generally oblong-obovate unequal lobes. Drupe ovoid, purple, from 8 to 9 millimetres high, crowned by the persistent calyx-lobes; stone ovoid, slightly compressed, inflexed on the inner edges and therefore T-shaped in cross section, about 7 millimetres long and 5 millimetres broad, with a dorsal groove and a deep ventral furrow; seed densely covered with red resinous glands; albumen deeply ruminate.

A loosely branched shrub, with branchlets stellate-lepidote while young, becoming in their second year reddish brown, smooth, and somewhat lustrous, and ultimately grayish brown. Winter-buds naked. Flowers appearing with the leaves.

China: Hupeh, *A. Henry* (Nos. 5759 A and 6707), *E. H. Wilson* (Nos. 94, 1796, 1812); Szech'uan, Nan-chuan, *A. von Rosthorn* (ex Gräbner).

Viburnum sympodiale is closely related to *Viburnum furcatum*, Blume, from which it differs chiefly in its stipulate petioles and smaller ovate more finely serrate leaves mostly rounded at the base. The peculiar sympodial ramification which is particularly mentioned by Gräbner also occurs in the allied species, *Viburnum furcatum*, Blume, *Viburnum alnifolium*, Marshall, and *Viburnum cordifolium*, Wallich, and also in *Viburnum urceolatum*, Siebold & Zuccarini.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXXXIX. VIBURNUM SYMPODIALE.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.

Figures 1 and 2 were made from Wilson's No. 1796, and figures 3 to 6 from Henry's No. 7607.

C. E. Faxon del.

VIBURNUM SYMPODIALE, Gräbn.

VIBURNUM SHENSIANUM, MAXIM.

VIBURNUM SHENSIANUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 480 (1880); *Mél. Biol.* x. 653.—Hemsley, *Jour. Linn. Soc.* xxiii. 355.

VIBURNUM DIELSII, Gräbner, *Engler Bot. Jahrb.* xxix. 588 (1900).

VIBURNUM GIRALDII, Gräbner, *Engler Bot. Jahrb.* xxxvi. Beibl. No. lxxxii. 99 (1905).

Leaves membranaceous, oval or ovate to elliptic, obtuse or acutish, rounded or broadly cuneate at the base, denticulate, dark yellowish green and glabrous or furnished with scattered fasciculate hairs on the upper surface, paler green and more or less covered with yellowish stellate tomentum on the lower surface, from 2 to 5 centimetres long and from 1.2 to 3.5 centimetres broad, with five or six pairs of veins usually anastomosing, but sometimes partly ending in the teeth, indistinct above and elevated beneath, and inconspicuous veinlets; petioles grooved, from 5 to 10 millimetres in length, stellate-pubescent. Corymbs terminal, from 5 to 8 centimetres in diameter, covered with dense yellowish stellate pubescence, on peduncles from 3 to 15 millimetres long, rarely longer; sometimes nearly sessile; rays usually five, the central one the shortest; flowers on rays of the third or sometimes of the second order; ovary cylindric, 4 millimetres long, glabrous; calyx-teeth triangular-ovate, very short; corolla campanulate-rotate, about 6 millimetres in diameter, glabrous, the lobes ovate, somewhat longer than the tube; stamens as long or somewhat exceeding the corolla; anthers broadly oval, yellow; style conical, short, scarcely longer than the calyx-teeth. Drupe ellipsoid-oblong, bluish black, crowned by the persistent calyx-teeth; stone oblong, from 8 to 9 millimetres long and 4.5 millimetres broad, convex on the dorsal side, with three ventral grooves, the two lateral often very shallow; seed covered with red resinous glands.

A shrub, with slender forked branches, and branchlets stellate-pubescent while young, becoming gray or grayish brown in their second year, and ultimately gray, and usually marked by a few scattered lenticels. Winter-buds naked. Flowers appear with the leaves.

China: Shensi, *Piasezki*, 1875 (Herb. St. Petersburg), *G. Giraldi* (Nos. 142, 144–149, 2563–2581, 7199, 7200 in Herb. Florence); Szech'uan, *A. von Rosthorn* (Nos. 1885, 1887, 1891 in Herb. Christiania).

Viburnum shensianum is most closely related to *Viburnum burejæticum*, Regel & Herder, and to *Viburnum glomeratum*, Maximowicz; from these species it is easily distinguished by the quite glabrous ovary, the narrower and longer fruits, and by the convex dorsal side of the stone. The leaves are generally smaller and more obtuse than those of *Viburnum burejæticum*, but in Rosthorn's Nos. 1887 and 1891 they can hardly be distinguished from the leaves of that species, while the leaves of *Viburnum glomeratum* are more strongly veined, the veins ending in the teeth. With the type specimens of *Viburnum shensianum*, *Viburnum Dielsii*, and *Viburnum Giraldii* before me I am unable to find a single good character by which these plants can be distinguished; Rosthorn's No. 1885 agrees in every respect with Piasezki's specimen, while Giraldi's specimens differ slightly in the more pubescent upper surface of the leaves and in the generally longer peduncles. The chief distinctive character given by Gräbner for his *Viburnum Giraldii* is "corolla campanulato-infundibuliformis, staminibus subinclusis," but I find the corolla rotate-campanulate, with the tube shorter than the limb, exactly as in his *Viburnum Dielsii*, and the stamens in Giraldi's specimens are really as long at least as the corolla. I also refer provisionally to this species Faber's No. 1545 (in Herb. Kew), which differs in its larger inflorescence, larger flowers, and larger leaves more densely pubescent on the two surfaces and more strongly veined.

ALFRED REHDER.

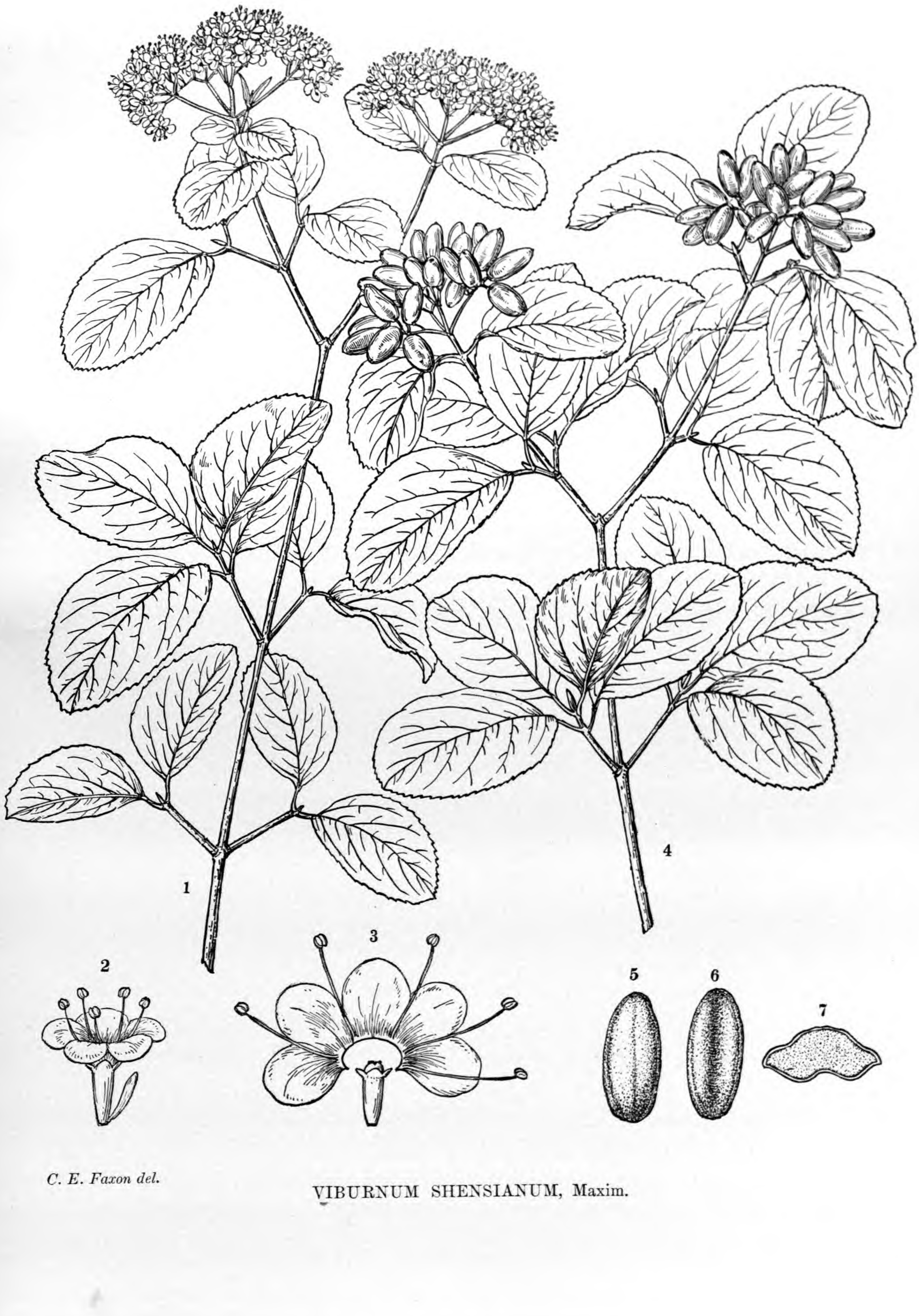
Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXL. VIBURNUM SHENSIANUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, natural size.
5. A stone, dorsal view, enlarged.
6. A stone, ventral view, enlarged.
7. Cross section of a stone, enlarged.

Figures 1 to 3 are made from Von Rosthorn's No. 1885 and figures 4 to 7 from Giraldi's No. 144.



C. E. Faxon del.

VIBURNUM SHENSIANUM, Maxim.

VIBURNUM URCEOLATUM, SIEB. & ZUCC.

VIBURNUM URCEOLATUM, Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. iii. 172 (1846).—Miquel, *Ann. Mus. Lugd.-Bat.* ii. 268; *Prol. Fl. Jap.* 156.—Franchet & Savatier, *Enum. Pl. Jap.* i. 201.—Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 480; *Mél. Biol.* x. 655.

Leaves membranaceous, ovate to ovate-lanceolate, long-acuminate, rounded or rarely narrowed at the base, crenately serrate, dark yellowish green and glabrous on the upper surface, lighter green on the lower surface, from 6 to 12 centimetres long and from 2 to 7 centimetres broad, with five or six pairs of anastomosing veins slightly impressed above, elevated and like the midribs stellate-lepidote beneath and connected by conspicuous transverse veinlets; petioles slender, grooved, sparingly stellate-lepidote while young, soon becoming nearly glabrous, from 1 to 2 centimetres in length. Corymbs terminal, long-stalked, glabrous or nearly so, from 3 to 6 centimetres in diameter; rays usually five, the central one slightly shorter than the others; flowers on rays of the second or third order; ovaries cylindric, 2 millimetres long, glabrous like the small ovate calyx-teeth; corolla cylindric-campanulate, slightly constricted at the mouth, about 3 millimetres high, the lobes short, upright, broadly ovate, pinkish; stamens slightly exceeding the corolla; anthers oblong; style thick, cylindric, exceeding the calyx-teeth. Drupe ovoid, about 6 millimetres long, black; stone much compressed, ovoid, with three ventral grooves and two dorsal grooves.

A shrub, apparently low and straggling, with terete sparingly stellate-lepidote or almost glabrous branchlets, becoming in their second year reddish brown or light yellowish brown and marked by occasional small lenticels. Winter-buds naked. Flowers appear shortly after the leaves.

Japan: Hondo, Umoto, September 6, 1892, *C. S. Sargent*, Jizogatake, July, 1903, *U. Faurie* (No. 5485 in Herb. Arnold Arboretum), Lake Chuzenji, August 12, 1905, *J. G. Jack;* Kiu-siu, Ko-isi-wara, 1863, *Maximowicz.*

Viburnum urceolatum is not very closely related to any other species; in the shape of the corolla it recalls *Viburnum cylindricum*, Hamilton, and in its mode of branching it resembles *Viburnum furcatum*, Blume, and allied species, while the characters of the fruit and of the foliage point to a relationship with *Viburnum burejæticum*, Herder & Regel.

As an ornamental plant *Viburnum urceolatum* has apparently little to recommend it, and it is doubtful whether it is now in cultivation.

ALFRED REHDER.

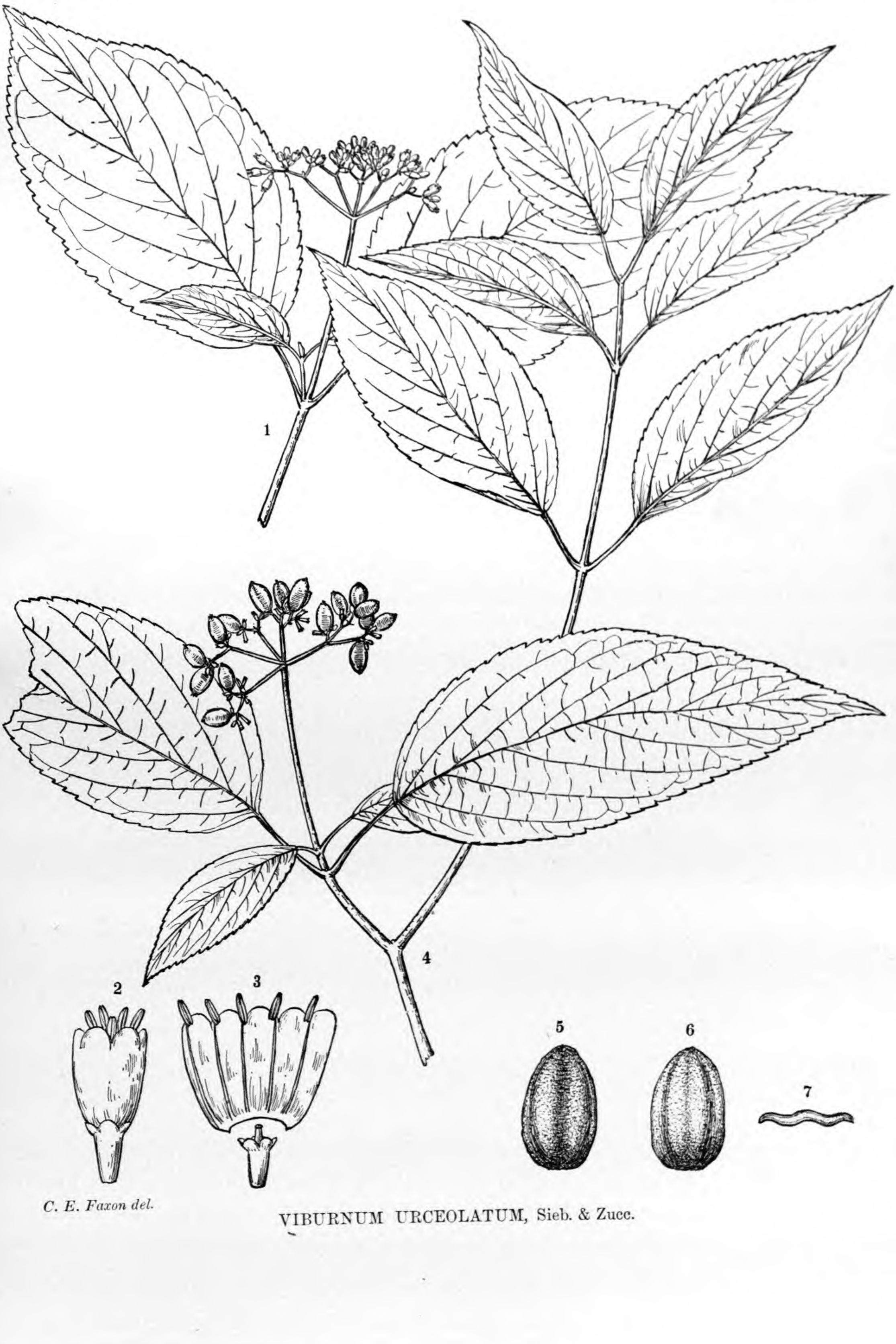
Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLI. VIBURNUM URCEOLATUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, natural size.
5. A stone, dorsal view, enlarged.
6. A stone, ventral view, enlarged.
7. Cross section of a stone, enlarged.

The plate is made from Maximowicz's specimen preserved in the Gray Herbarium.



C. E. Faxon del.

VIBURNUM URCEOLATUM, Sieb. & Zucc.

VIBURNUM UTILE, HEMSL.

VIBURNUM UTILE, Hemsley, *Jour. Linn. Soc.* xxiii. 356 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 585. — *Bot. Mag.* t. 8174.

VIBURNUM COTINIFOLIUM, Hance, *Jour. Bot.* xx. 6 (not Don) (1882).

Leaves coriaceous, persistent, ovate-oblong or sometimes ovate to lanceolate-ovate, rounded or broadly cuneate at the base, obtusish, with entire and slightly revolute margins, dark yellowish green, glabrous and lustrous on the upper surface, densely whitish tomentose, interspersed, particularly on the veins, with fulvous hairs on the lower surface, from 3 to 6 centimetres long and from 1 to 3 centimetres broad, with five or six pairs of only slightly elevated veins; petioles densely grayish tomentose, from 3 to 7 millimetres in length. Corymbs terminal, on stout peduncles from 1.5 to 3 centimetres long, umbelliform, from 5 to 7 centimetres in diameter, densely clothed with yellowish white tomentum; rays usually five. Flowers mostly on rays of the third order; ovary cylindric, 2 millimetres long, glabrous; calyx-teeth ovate, glabrous or with a few stellate hairs on the margins; corolla campanulate-rotate, white, from 8 to 9 millimetres in diameter, the lobes orbicular-ovate, about as long as the tube; stamens slightly shorter than the corolla or about as long; anthers suborbicular, yellow; style short and thick, scarcely exceeding the sepals. Drupe ovoid, about 8 millimetres long, bluish black, crowned by the persistent calyx; stone ovoid, compressed, 7 millimetres long and 5 millimetres broad, with three ventral grooves and two shallow dorsal grooves; seed covered with red resinous glands.

A shrub, 1.20 metres high (according to Henry), with upright virgate stems, lateral branches spreading at obtuse angles, and branchlets covered when they first appear with dense yellowish or grayish white tomentum, soon becoming glabrous, and reddish brown in their second year. Winter-buds naked. Flowers appear in spring with the young leaves.

China: Hupeh, *A. Henry* (Nos. 260, 620), *E. H. Wilson* (No. 31); Szech'uan, *E. Faber* (ex Hemsley); Kweichau, *W. Mesny* (ex Hemsley).

VIBURNUM UTILE, var. ELÆAGNIFOLIUM, *n. var.*

This differs from the type in its more slender branches covered while young with yellowish brown tomentum, in the oblong-lanceolate slender-petioled leaves, light yellowish green above, in the much smaller few-flowered inflo- not exceeding 3 centimetres in diameter, and in the fruits being mostly on rays of the second order.

estern Hupeh, *E. H. Wilson* (No. 31, partly, the fruiting branch in Herb. Arnold Arboretum).

n utile is distinguished from most species of the section Lantana by its thick coriaceous entire leaves, smooth us above and densely stellate-tomentose beneath. From the more closely related *Viburnum congestum*, t differs in the larger flowers and shorter corolla-tube, and from *Viburnum Bockii*, Gräbner, and *Viburnum* Gräbner, in the thicker leaves whitish tomentose beneath.

ccording to Dr. Henry, the branches are used for making pipe-stems.

Viburnum utile is now in cultivation in the Veitchian nurseries, near London, and is described as a neat and attractive shrub.[1]

ALFRED REHDER.

Arnold Arboretum.

[1] *Hortus Veitchi*, 410 (1906).

EXPLANATION OF THE PLATE.

PLATE CXLII. VIBURNUM UTILE.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.

This plate was made from Henry's Hupeh specimens preserved in the Gray Herbarium.

C. E. Faxon del.

VIBURNUM UTILE, Hemsl.

VIBURNUM CYLINDRICUM, HAMILT.

VIBURNUM CYLINDRICUM, Hamilton ex Don, *Prodr. Fl. Nepal.* 142 (1825[1]). — De Candolle, *Prodr.* iv. 329.

VIBURNUM CORIACEUM, Blume, *Bijdr. Fl. Ned. Ind.* 656 (1825). — De Candolle, *Prodr.* iv. 329. — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 179. — Miquel, *Fl. Ind. Bat.* ii. 120. — Brandis, *Forest Fl. Brit. Ind.* 259. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 5. — Hemsley, *Jour. Linn. Soc.* xxiii. 351. — Koorders & Valeton, *Bijdr. Boomsort. Java,* v. 38. — Gräbner, *Engler Bot. Jahrb.* xxix. 587.

Leaves coriaceous, persistent, elliptic to oblong or ovate-oblong, acuminate, narrowed or sometimes rounded at the base, entire or more often with a few remote short and obtuse teeth, glabrous, dark yellowish green and lustrous on the upper surface, lighter green and sparingly dotted with minute dark glands on the lower surface, from 8 to 16 centimetres long and from 3 to 6 centimetres broad, with three or four pairs of anastomosing veins prominent beneath and connected by conspicuous veinlets; petioles grooved, glabrous, from 1 to 3 centimetres in length. Corymbs terminal, convex, glabrous, from 6 to 10 centimetres in diameter, on peduncles from 2 to 6 centimetres long; rays usually seven, of nearly equal length; flowers mostly on rays of the third order; ovary ovoid or turbinate, glandular, with very minute and indistinct calyx-lobes; corolla tubular-campanulate, from 4 to 5 millimetres long, minutely lepidote, white or slightly tinged with pink, the lobes orbicular-ovate, upright, 1 millimetre in length; stamens exceeding the limb of the corolla; anthers oblong; style short and thick, conical. Drupe ovoid, small, bluish black, crowned by the persistent calyx-lobes; stone ovoid, slightly compressed, 4.5 millimetres high and 3.5 millimetres broad, with one shallow ventral groove and two shallow dorsal grooves; seed brownish red.

A tree, occasionally 15 metres high, with glabrous branchlets and reddish or grayish brown branches marked by small scattered lenticels. Winter-buds with one pair of scales.

China: western Hupeh, *E. H. Wilson* (Nos. 2493 and 3729); Szech'uan, Mount Omei, altitude 1000 metres, *E. Faber* (ex Gräbner); Yunnan, altitude from 1700 to 2000 metres, *A. Henry* (Nos. 9757, 9757 c, and 9757 d); also in India and Java.

Viburnum cylindricum has no close relationship with any other species. In the shape of the corolla it resembles *Viburnum urceolatum*, Siebold & Zuccarini, which differs widely from it, however, in other characters.

Viburnum cylindricum seems to be still little known in gardens; as shown by a specimen in the herbarium of the Arnold Arboretum it was in cultivation about 1882 at Kew, where it had been introduced from India, but was apparently lost soon afterwards. Recently it has been introduced from Yunnan into the Jardin des Plantes at Paris,[2] and from Hupeh into the Veitchian nurseries. The handsome evergreen foliage of this species resembles that of a green Aucuba and constitutes its chief ornamental feature; its flowers and fruits are excelled in beauty by those of most Viburnums.

ALFRED REHDER.

Arnold Arboretum.

[1] Don's *Prodromus Floræ Nepalensis*, the preface of which is dated October, 1824, was probably published at the beginning of 1825, while part 13 of Blume's *Bijdragen* containing the description of *Viburnum coriaceum* could not have been published before the end of 1825, as it was the last of the thirteen parts published in that year, part 14 being dated 1826.

[2] Bean, *The Garden*, lvi. 79 (1899). *Viburnum cylindricum* has flowered in the Vilmorin Arboretum at Les Barres in France.

EXPLANATION OF THE PLATE.

PLATE CXLIII. VIBURNUM CYLINDRICUM.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, natural size.
5. A stone, dorsal view, enlarged.
6. A stone, ventral view, enlarged.
7. Cross section of a stone, enlarged.

The plate is made from Wilson's specimens collected in western Hupeh.

1

4

2

3

5

6

7

C. E. Faxon del.

VIBURNUM CYLINDRICUM, Hamilt.

VIBURNUM PYRAMIDATUM, REHD.

VIBURNUM PYRAMIDATUM, *n. sp.*

Leaves chartaceous, ovate-oblong to oblong, acuminate, narrowed at the base, denticulate-serrate, dark green, glabrous and lustrous on the upper surface, light green and loosely covered with fasciculate hairs on the lower surface, especially on the six or seven pairs of anastomosing veins, from 8 to 19 centimetres long and from 4 to 8 centimetres broad; petioles 1.5 to 2.5 centimetres in length, densely fasciculate-pilose. Corymbs terminal, pyramidal in outline, from 5 to 6 centimetres in diameter and about as high, consisting of three or four remote whorls of from four to six rays, decreasing in size toward the apex; peduncle from 2 to 4 centimetres long, densely yellowish fasciculate-pilose like the rays; flowers mostly on rays of the third order; ovary cylindric, glabrous, with ovate sparingly ciliate calyx-teeth about half as long as the tube; corolla rotate, about 4 millimetres in diameter, with ovate lobes; stamens slightly shorter than the corolla; anthers oval; style cylindric, exceeding the calyx-teeth. Drupe narrow-oblong, about 1 centimetre long and from 4 to 5 millimetres broad, crowned by the persistent calyx, apparently dark red; stone compressed and slightly curved, with two deep grooves on the ventral side and one shallower dorsal groove; seed densely covered with red resinous glands; albumen ruminate.

A tree, 6 or 7 metres high, with terete branchlets furnished with fascicled and stellate yellowish hairs, and becoming in their second year glabrescent and light grayish yellow. Winter-buds with one pair of scales.

China: Yunnan, Mengtze, altitude 1700 metres, *A. Henry* (No. 11475).

Viburnum pyramidatum is closely related to *Viburnum lutescens*, Blume (*V. sundaicum*, Miquel), but is easily distinguished from that species by the pubescent branchlets and by the pubescence on the under surface of the leaves. In foliage it also resembles the Himalaya *Viburnum Colebrookianum*, Wallich, but that species is very different in the absence of the deep ventral furrows of the stone, in its solid albumen and lateral corymbs.

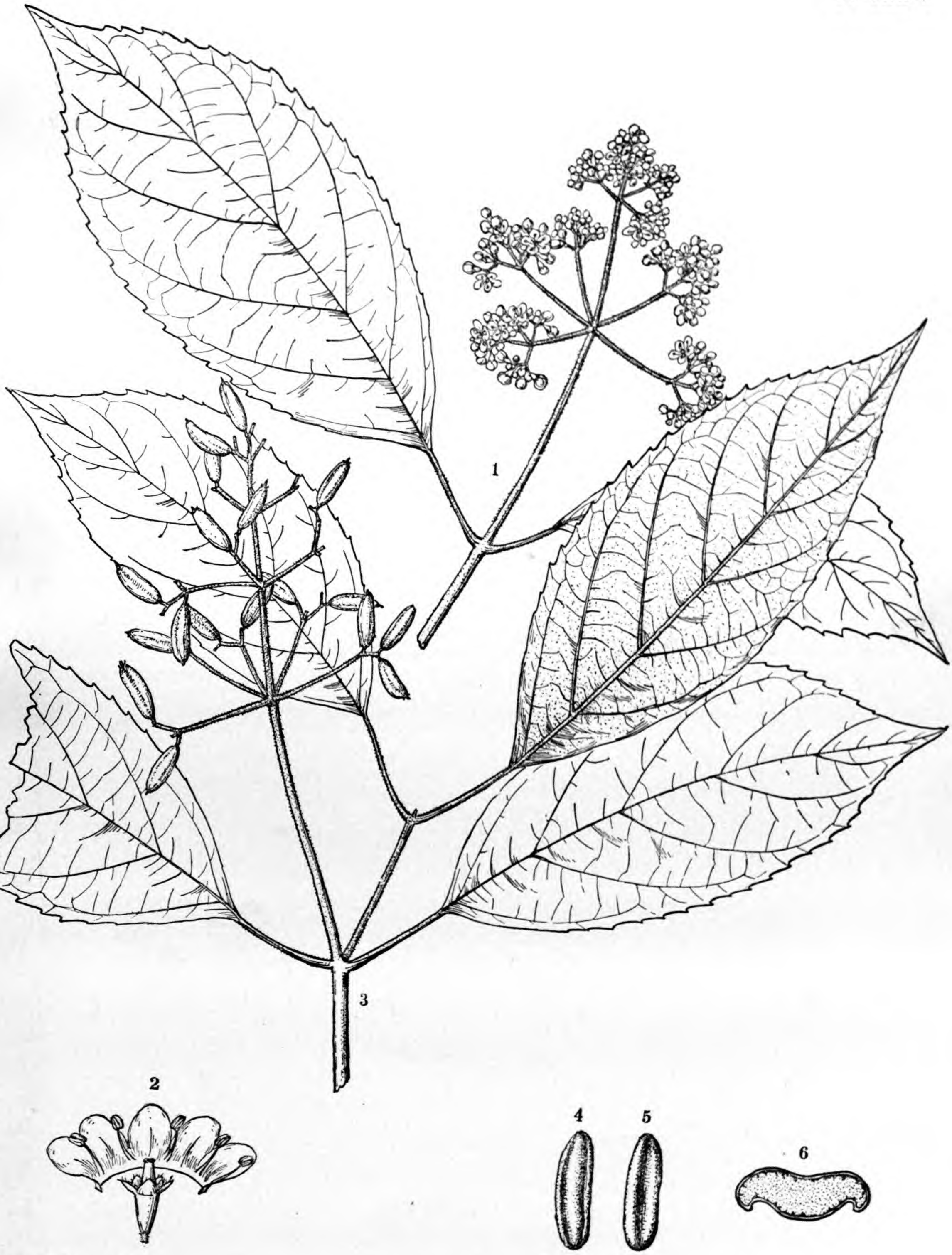
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLIV. VIBURNUM PYRAMIDATUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone.



C. E. Faxon del.

VIBURNUM PYRAMIDATUM, Rehd.

VIBURNUM SEMPERVIRENS, K. KOCH.

VIBURNUM SEMPERVIRENS, K. Koch, *Hort. Dendr.* 300 (1853); *Wochenschr. Gaertn. Pflanzenk.* x. 109. — Oersted, *Videnskb. Medd. fra Nat. For. Kjöbenh.* xii. (1860), 299, t. 6, f. 28–31. — Vatke, *Ind. Sem. Hort. Berol.* 1875, appx. 1. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xxvi. 479; *Mél. Biol.* x. 651. — Hemsley, *Jour. Linn. Soc.* xxiii. 355.

VIBURNUM NERVOSUM, Hooker & Arnott, *Bot. Voy. Beechey,* 190 (not Don) (1833). — Champion & Bentham, *Hooker Jour. Bot. and Kew Gard. Misc.* iv. 166.

VIBURNUM VENULOSUM, Bentham, *Fl. Hongkong,* 142 (1861).

Leaves coriaceous, persistent, elliptic to elliptic-ovate or rarely oval, acute or shortly acuminate at the apex, narrowed at the base, entire or furnished with a few remote teeth near the apex, more or less distinctly three-nerved by the greater development of the lowest pair of veins, dark green, glabrous and lustrous above, lighter green, glabrous and dotted beneath with minute black glands, and from 4 to 9 centimetres long, with three or four pairs of primary veins anastomosing before reaching the margins, impressed on the upper surface, prominent on the lower surface and connected by distinct transverse veinlets; petioles nearly terete, from 5 to 10 millimetres long, glabrous or rarely furnished with a few scattered hairs. Corymbs terminal, umbelliform, glabrous, from 4 to 5 centimetres in diameter, nearly sessile, or on quadrangular peduncles not exceeding 1 centimetre in length; rays usually five, the central one the shortest, furnished with glabrous linear-lanceolate caducous bracts; flowers on rays of the third order, sessile; ovary ovoid, glabrous like the semiorbicular calyx-teeth; corolla rotate, glabrous, about 4 millimetres in diameter, the suborbicular lobes scarcely longer than the tube; stamens slightly exceeding the corolla; anthers broadly oval; style short and thick, slightly exceeding the calyx-lobes. Drupe red, globose-ovoid, crowned by the persistent calyx; stone much compressed, about 6 millimetres high and 5 millimetres broad, concave on the ventral side, convex on the dorsal side.

A glabrous shrub, with grayish brown branches, and pale yellow quadrangular branchlets, becoming in their second year reddish brown, lustrous, and nearly terete. Winter-buds with two pairs of scales.

China: Hongkong, *C. Ford, C. Wright;* Anwhei and Kwangtung (ex Hemsley); Yunnan, Szemeo, altitude 1600 metres, *A. Henry* (No. 12753).

The Yunnan specimen collected by Henry differs from the type of *Viburnum sempervirens* in the presence of scattered fasciculate hairs on the inflorescence, petioles, and on the under side of the midribs of the leaves; but as the specimen does not otherwise differ from *Viburnum sempervirens*, and as a few scattered hairs occur on the petioles and inflorescence of Wright's specimen from Hongkong in Herb. Gray, the Yunnan plant can hardly be considered a different species.

ALFRED REHDER.
Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLV. VIBURNUM SEMPERVIRENS.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.
7. Longitudinal section of a stone, enlarged.

Figures 1 to 3 were made from Hongkong specimens preserved in the Gray Herbarium; figures 4 to 7, from Henry's Yunnan specimens preserved in the Herbarium of the Arnold Arboretum.

C. E. Faxon del.

VIBURNUM SEMPERVIRENS, K. Koch

VIBURNUM LUZONICUM, ROLFE.

RNUM LUZONICUM, Rolfe, *Jour. Linn. Soc.* xxi. 310 (1884).

ıves membranaceous, ovate, acuminate, rounded or broadly cuneate at the base, sinuate-dentate and ciliate on the margins, dark yellowish green above and sparingly furnished with furcate hairs most abundant on the veins, lighter green below and soft-pubescent with fasciculate hairs, particularly on the veins, from 4 to 6 centimetres long and from 2 to 3.5 centimetres broad, with from five to six pairs of straight veins ending in the teeth; petioles from 3 to 5 millimetres in length, densely fulvous-pubescent. Corymbs terminal, short-stalked, from 3 to 4 centimetres in diameter, densely fulvous-pubescent; rays four or five of almost equal length; flowers on rays of the second or third order; ovary ovoid, 1 millimetre long, densely fulvous-pubescent like the short ovate calyx-lobes; corolla rotate, from 4 to 5 millimetres in diameter, pilose outside, its lobes ovate, longer than the tube; stamens shorter than the corolla; anthers oval, yellow; style short, conical. Drupe ovoid, red (not seen).

A slender-branched shrub, with densely fulvous-pubescent branchlets, becoming reddish brown in their second season and nearly glabrous the following year. Winter-buds with two pairs of scales.

Philippine Islands: Luzon, Province Benguet, March, 1907, *A. D. E. Elmer* (No. 8655 in Herb. Arnold Arboretum). A variety from Formosa is

VIBURNUM LUZONICUM, var. FORMOSANUM, *n. var.*

Viburnum erosum, var. *formosanum*, Hance, *Ann. Sci. Nat.* sér. 5, v. 216 (1866).

Viburnum dilatatum, *β formosanum*, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 489 (1880); *Mél. Biol.* x. 666.

Viburnum erosum, Hemsley, *Jour. Linn. Soc.* xxiii. 351 (in part, not Thunberg) (1888). — Henry, *As. Soc. Jap. Trans.* xxiv, suppl. 49. — Matsumura & Hyata, *Jour. Coll. Sci. Tokio*, xxii. 180 (*Enum. Pl. Formosa*).

This form differs from the type in the firmer chartaceous leaves glabrous above except on the midribs, less pubescent beneath, and sometimes nearly glabrous at maturity, and in the less pubescent branchlets and inflorescence. The drupe is ovoid, red, crowned by the persistent calyx, with a stone broadly ovoid, pointed at the apex and truncate at the base, much compressed, with three shallow ventral grooves and two very shallow dorsal grooves, 5 millimetres long and 4 millimetres broad. The branchlets often bear below the terminal corymb one or several pairs of corymbs on short lateral branchlets.

Formosa: Tamsui, 1864, *R. Oldham* (Nos. 204 and 206 in Herb. Gray), Bankinsing, *A. Henry* (Nos. 161 and 569 in Herb. Arnold Arboretum), South Cape, *A. Henry* (Nos. 607, 652, 949, 1272 in Herb. Arnold Arboretum), Okaseki, *U. Faurie* (No. 281 in Herb. Arnold Arboretum).

The characters by which the Formosa plant differs from the type from the Philippine Islands do not seem to be sufficient to separate it as a different species. From *Viburnum dilatatum*, Thunberg, however, with which Maximowicz placed it, it differs in the smaller ovate leaves, the shorter stamens, the nearly sessile corymb, and the smaller flowers and fruits. According to Dr. Henry, the savages of Formosa make bows of the wood.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLVI. VIBURNUM LUZONICUM.

1. A flowering branch, natural size.
2. A flower bud, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch of *Viburnum luzonicum*, var. *formosanum*, natural size.
5. A stone of the same variety, dorsal view, enlarged.
6. A stone of the same variety, ventral view, enlarged.
7. Cross section of a stone of the same variety, enlarged.

Figures 1 to 3 are made from Elmer's No. 8655, and figures 4 to 7 from Henry's No. 1272.

C. E. Faxon del.

VIBURNUM LUZONICUM. Rolfe

VIBURNUM BETULIFOLIUM, Batal.

Viburnum betulifolium, Batalin, *Act. Hort. Petrop.* xiii. 371 (1894).
Viburnum Willeanum, Gräbner, *Engler Bot. Jahrb.* xxix. 589 (1901).

Leaves deciduous, ovate to rhombic-ovate and from 3 to 6 centimetres long and from 2 to 4 centimetres broad, or rarely elliptic-oblong and from 6 to 8 centimetres long and from 2 to 4.5 centimetres broad, acute or short-acuminate, broadly cuneate at the base, coarsely dentate except the lower third, with four or five pairs of straight veins, glabrous and dark green on the upper surface, lighter green and glabrous on the lower surface with the exception of a few simple hairs on the veins; petioles slender, from 1 to 1.5 centimetres in length, sparingly hairy or glabrous, furnished near the base with two small stipules. Corymbs terminal, umbelliform, from 6 to 10 centimetres in diameter, on peduncles from 1 to 2 centimetres long, or occasionally shorter, and glabrous or slightly hairy; rays usually seven, sparingly covered with short fascicled hairs or sometimes nearly glabrous; flowers on rays of the third and fourth order; ovary glandular and sparingly hairy; calyx-teeth minute, broadly triangular, ciliate; corolla rotate, glabrous, scarcely 5 millimetres in diameter, the lobes orbicular-ovate, longer than the tube; stamens exceeding the corolla; anthers oval, yellow; style short, conical, scarcely exceeding the calyx-lobes. Drupe red, subglobose, about 6 millimetres high; stone compressed, 3.5 millimetres high and 3 millimetres broad, with three very shallow ventral grooves and two equally shallow dorsal grooves.

A shrub, with glabrous branches, and branchlets purple or purplish brown during their first and second years, later becoming marked by longitudinal fissures. Winter-buds with two pairs of scales.

China: Kansu, Tshagon, July, 1885, and Fen-shan-ling, September, 1885, *G. N. Potanin* (Herb. St. Petersburg); Hupeh, *A. Henry* (No. 6262), Patung, *E. H. Wilson* (No. 1407); Szech'uan, Nan-chuan, *A. von Rosthorn* (No. 1910 in Herb. Christiania).

Viburnum betulifolium seems most closely related to *Viburnum Wrightii*, Miquel, but differs chiefly in the presence of stipules, in the more coarsely serrate ovate or rhombic-ovate leaves, with fewer veins, and in the glandular and hairy ovary. The type specimens of *Viburnum betulifolium* do not differ in the least from the type of *Viburnum Willeanum*.

As Mr. Wilson collected mature seeds of this species, plants of it are probably now growing in the Veitchian nurseries near London. As an ornamental shrub *Viburnum betulifolium* will probably be as valuable as *Viburnum Wrightii*, and, like that species, will doubtless be a handsome object in flower and in fruit.

Alfred Rehder.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLVII. VIBURNUM BETULIFOLIUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, dorsal view, enlarged.
5. A stone, ventral view, enlarged.
6. Cross section of a stone, enlarged.

The plate was made from the type specimens from Kansu preserved in the Herbarium of the Imperial Botanic Garden at St. Petersburg.

C. E. Faxon del.

VIBURNUM BETULIFOLIUM, Batal.

VIBURNUM LOBOPHYLLUM, GRÄBN.

VIBURNUM LOBOPHYLLUM, Gräbner, *Engler Bot. Jahrb.* xxix. 589 (1901).

Leaves membranaceous, ovate to orbicular-ovate or sometimes broadly obovate, acuminate or abruptly acuminate at the apex, rounded, truncate or rarely broadly cuneate at the base, dentate, with shallow mucronate teeth, yellowish green and glabrous or sparingly hairy and pubescent on the midribs above, lighter green and glabrous beneath, with the exception of sparse loosely appressed hairs on the midribs and veins, from 6 to 11 centimetres long and from 4 to 8.5 centimetres broad, with six or seven pairs of straight veins, and transverse veinlets conspicuous beneath; petioles slender, from 1.5 to 3 centimetres in length, furnished near the base with two small sometimes caducous stipules. Corymbs terminal, from 5 to 10 centimetres in diameter, on peduncles from 2 to 3 centimetres long or occasionally shorter, and thinly and minutely pubescent and glandular like the rays, or rarely glabrescent; rays seven, slender; flowers mostly on rays of the third order, pedicellate; ovary ellipsoid or nearly cylindric, about 1 millimetre long, glandular and usually furnished with a few simple hairs; calyx-lobes orbicular-ovate, ciliate or nearly glabrous; corolla rotate, 6 millimetres in diameter, the lobes orbicular-ovate, longer than the tube; stamens exceeding the corolla; anthers oval, yellow; style about twice as long as the calyx-lobes, cylindric. Drupe subglobose, bright red, about 7 millimetres high; stone flattened, suborbicular, rounded at the base, pointed at the apex, and 5.5 millimetres high and broad, with one shallow ventral groove and two shallow dorsal grooves.

A shrub, with upright branches, and pale yellowish brown branchlets sparingly hairy when they first appear, becoming glabrous and dark reddish brown at the end of their first year. Winter-buds with two pairs of scales, glabrous, reddish brown.

China: Shensi, In-kia'u, August, 1896, "in alto monte Ngo-san," September, 1899, and "in alto monte Thae-pei-san," August, 1899, *G. Giraldi* (Nos. 1467, 2555, 2556 in Herb. Florence); Hupeh, *A. Henry* (Nos. 2885, 6250), *E. H. Wilson* (No. 900); Szech'uan, *A. Henry* (No. 8930).

Viburnum lobophyllum is most nearly related to *Viburnum Wrightii*, Miquel, but differs from that species in the longer petioles with stipules, the glandular inflorescence, and the cylindric style; from the allied *Viburnum betulifolium*, Batalin, it may be distinguished by the shape of the leaves and their pubescent veins, the longer peduncles, smaller corymbs, and by the shape of the stone. Of the flowering specimens, Henry's No. 8930, referred by Hemsley to *Viburnum dilatatum*, Thunberg, agrees perfectly with the type in the shape of the leaves except that they are smaller, while in the other flowering specimens the leaves are more or less distinctly ovate.

The original description of *Viburnum lobophyllum* is somewhat misleading, as the leaves are described as three-lobed or entire and crenate, but the leaves can hardly be called lobed or their margins crenate. The leaves which show the nearest approach to being lobed are not different in shape from the broadly obovate leaves of *Viburnum Wrightii*, Gray, and *Viburnum dilatatum*, Thunberg, in which the almost truncate or slightly sinuate apex is abruptly contracted into the acumen.

ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLVIII. VIBURNUM LOBOPHYLLUM.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.

Figures 1 and 2 are made from Henry's No. 8930 preserved in the Gray Herbarium; figures 3 to 6 from Giraldi's No. 1467 preserved in the Herbarium of the Botanic Museum at Florence.

C. E. Faxon del.

VIBURNUM LOBOPHYLLUM, Gräbn.

VIBURNUM DASYANTHUM, REHD.

VIBURNUM DASYANTHUM, *n. sp.*

Leaves membranaceous, ovate or elliptic to oblong, long-acuminate, rounded at the base, remotely denticulate, dark green and glabrous on the upper surface, lighter green and nearly glabrous on the lower surface, from 6 to 12 centimetres long and from 2.5 to 5.5 centimetres broad, with six or seven pairs of straight veins slightly pilose like the midribs below and furnished with tufts of axillary hairs; petioles slender, from 1.5 to 2 centimetres in length, glabrous and purplish. Corymbs terminal, lax, from 8 to 10 centimetres in diameter, on glabrous purplish peduncles from 1 to 3 centimetres long; rays usually seven, sometimes five, glabrous, their ramifications densely villous; flowers on rays of the third or fourth order; ovary ovoid, 1 millimetre long, densely villous like the short broadly ovate calyx-teeth; corolla campanulate-rotate, densely villous outside, the lobes ovate, slightly longer than the tube; stamens exceeding the corolla; anthers oval, yellow. Drupe ovoid, red, about 8 millimetres in length; stone broadly ovoid, compressed pointed at the apex, rounded at the base, with one ventral groove and two shallow dorsal ridges; seed smooth, reddish.

Shrub, about 2.5 metres high (according to Wilson), with glabrous and lustrous branchlets, stout brown or dark purple branches. Winter-buds with two pairs of scales.

Hupeh, Patung, *E. H. Wilson* (No. 2218 in Herb. Arnold Arboretum).

Dasyanthum is most closely related to *Viburnum betulifolium*, Batalin, but is easily distinguished from that by villous flowers and raylets, and by the shape and serration of the leaves.

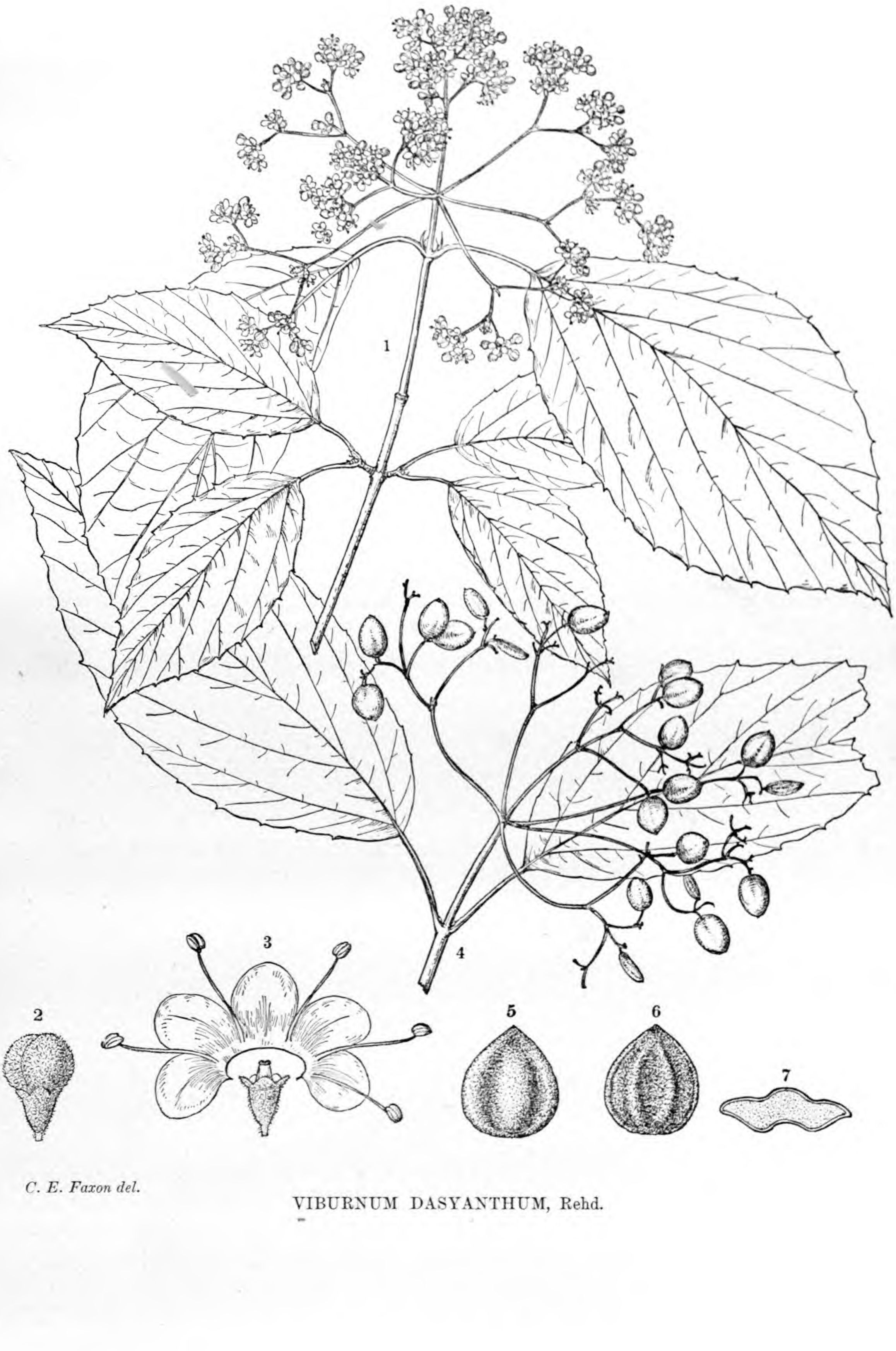
ALFRED REHDER.

Arnold Arboretum.

EXPLANATION OF THE PLATE.

PLATE CXLIX. VIBURNUM DASYANTHUM.

1. A flowering branch, natural size.
2. A flower bud, enlarged.
3. A flower with the corolla displayed, enlarged.
4. A fruiting branch, enlarged.
5. A stone, dorsal view, enlarged.
6. A stone, ventral view, enlarged.
7. Cross section of a stone, enlarged.



C. E. Faxon del.

VIBURNUM DASYANTHUM, Rehd.

VIBURNUM ICHANGENSE, REHD.

VIBURNUM ICHANGENSE, *n. sp.*

VIBURNUM EROSUM, var. ICHANGENSE, Hemsley, *Jour. Linn. Soc.* xxiii. 352 (in part) (1888).—Gräbner, *Engler Bot. Jahrb.* xxix. 589.

VIBURNUM EROSUM, var. SETCHUENSE, Gräbner, *Engler Bot. Jahrb.* xxix. 589 (1901).

Leaves membranaceous, ovate to ovate-lanceolate, acuminate, truncate or subcordate at the base, dentate, yellowish green and loosely covered on the upper surface with furcate or fascicled hairs borne on minute tubercles, more or less stellate-tomentose on the lower surface, particularly on the veins, the tomentum interspersed on the midribs with loosely appressed simple hairs, from 3.5 to 6.5 centimetres long and from 1.2 to 3 centimetres broad, with from six to nine pairs of straight veins ending in the teeth; petioles from 3 to 7 millimetres in length, pubescent, furnished with subulate persistent stipules. Corymbs terminal and lateral, from 2 to 4 centimetres in diameter, pubescent, on slender peduncles from 1 to 2 centimetres long; rays four or five, subtended like the raylets and flowers by linear pubescent bractlets; flowers on rays of the first and second order; ovary obovoid, 1.5 millimetres high, stellate-tomentose like the broadly ovate calyx-teeth; corolla rotate, 5 millimetres in diameter, glabrous; the lobes orbicular-ovate; stamens as long or somewhat shorter than the corolla; anthers suborbicular, yellow; style short, conical, as long as the calyx-lobes. Drupe ovoid, from 6 to 7 millimetres high, crowned by the persistent calyx-lobes, usually covered with scattered stellate hairs; stone 6 millimetres high and 4.5 millimetres broad, much compressed, with three shallow ventral grooves and two shallow dorsal grooves; seed brown.

A shrub, with slender branches covered with stellate and long simple hairs during their first year, becoming glabrescent and usually light grayish brown in their second season and reddish brown the following year. Winter-buds small, pubescent, with two pairs of scales.

China: Hupeh, *A. Henry* (Nos. 232, 1888, 2289, 5271, 5476, 6594), *E. H. Wilson* (Nos. 364, 569, 946); Szech'uan, S. Wushan (No. 5276), and N. Wushan, *A. Henry* (No. 7052), *A. von Rosthorn* (Nos. 2298, 2299 in Herb. Christiania).

Viburnum ichangense is most closely related to *Viburnum erosum*, Thunberg, but is readily distinguished from that species by the densely pubescent ovary, the smaller corymbs, and the smaller ovate to ovate-lanceolate distinctly acuminate leaves. Henry's No. 232, from which Rosthorn's specimens described by Gräbner as *Viburnum erosum*, var. *setchuense*, cannot be distinguished, must be considered the type of Hemsley's *Viburnum erosum*, var. *ichangense*. Gräbner may have compared Rosthorn's specimens with Henry's No. 1888, also quoted by Hemsley under his *Viburnum erosum*, var. *ichangense*. This, however, differs in its larger glabrescent leaves and may be a distinct variety, but without flowers I cannot venture a definite opinion in regard to it.

Twenty-one species of Viburnum from eastern Asia have now been figured and described in this work; and as the preparation of these plates and descriptions has made it necessary to study other Asiatic species of the genus, it seems desirable to give the following enumeration of all the known Japanese and Chinese Viburnums, especially as nearly three times as many are now known as there were in 1880 when Maximowicz wrote the last revision of the Asiatic Viburnums.

This enumeration has been made possible through the kindness of the keepers of the Herbaria at Kew, Florence, St. Petersburg, and Christiania, who have loaned the Arboretum the type specimens of the species not represented in the collections of Harvard University.

THE VIBURNUMS OF EASTERN ASIA.

CONSPECTUS OF THE SECTIONS.

Corym — il
Corym — fbs paniculate, with opposite ramifications; drupes black or purple; stone with a deep ventral furrow. I. THYRSOSMA.
S — ibs umbellate.
tone with a deep ventral furrow; corymbs sessile and terminal, or stalked and lateral; drupes purple or bluish black; shrubs with stellate tomentum. II. PSEUDOTINUS.

Stone with ventral and dorsal grooves or without grooves.
Winter-buds naked; drupes black or bluish black; stone much flattened, with shallow grooves; shrubs with stellate tomentum. III. LANTANA.
Winter-buds perulate, with one or two pairs of scales; shrubs with mostly fasciculate pubescence or glabrescent.
Leaves dentate or entire, penninerved.
Drupes bluish black or purple; winter-buds with one pair of scales; leaves entire or denticulate, with usually anastomosing veins; stipules wanting.
Stone more or less compressed and grooved, ovoid to oblong. IV. MEGALOTINUS.
Stone globose-ovoid, without grooves; albumen deeply ruminate; leaves persistent, glabrous; drupe bluish black. V. TINUS.
Drupes bright red; stone ovoid to broadly ovate-ovoid, with three ventral and two dorsal furrows often obsolete; leaves dentate, with the veins ending in the teeth (usually entire in No. 44), sometimes stipulate; winter-buds with two pairs of scales. VI. ODONTOTINUS.
Leaves lobed, palminerved; petioles stipulate; drupes red. VII. OPULUS.

CONSPECTUS AND ENUMERATION OF THE SPECIES.

I. THYRSOSMA, *n. sect.*

Leaves entire or dentate, without stipules; corymbs paniculate, with opposite ramifications; drupe ovoid to ellipsoid, bluish black or purple; stone slightly compressed, with a deep ventral furrow; albumen ruminate or solid; easily distinguished from the other sections by its paniculate inflorescence; the ruminate and also deeply furrowed albumen occurs also in the section Pseudotinus (*Thyrsosma*, Rafinesque, *Sylva Telluriana*, 130 [1838]).

Stamens inserted at varying heights in the elongated corolla-tube; flowers appearing before the leaves; leaves deciduous, serrate, with straight veins.
Leaves pubescent on the veins beneath; panicles many-flowered. 1. V. FRAGRANS.
Leaves glabrous beneath; panicles few-flowered. 2. V. NERVOSUM.
Stamens inserted at the same height; flowers appearing after the leaves.
Corolla rotate or campanulate-rotate.
Albumen not ruminate; leaves serrate, with straight or slightly anastomosing veins.
Leaves rounded at the apex, with the veins ending in the teeth, usually stellate-pubescent beneath.
Leaves with five or six pairs of veins, from 4 to 6 centimetres long; panicles fasciculate-tomentose, on two-leafed branchlets. 3. V. YUNNANENSE.
Leaves with from eight to twelve pairs of veins, from 6 to 12 centimetres long; panicles nearly glabrous, on four or six-leaved branchlets. 4. V. SIEBOLDII.
Leaves acute or acuminate, with often slightly anastomosing veins, glabrous; panicles glabrous. 5. V. HENRYI.
Albumen slightly ruminate; leaves entire or serrulate, with anastomosing veins, glabrous.
Panicles large and broad, glabrous; leaves entire or with a few blunt teeth, bluntly acuminate, large, persistent. 6. V. ODORATISSIMUM.
Panicles narrow, and together with the peduncles scarcely exceeding 5 centimetres in length, pubescent; leaves serrate or entire, acuminate. 7. V. BRACHYBOTRYUM.
Corolla infundibuliform.
Leaves acuminate, serrate, deciduous; panicles slender.
Panicles many-flowered; leaves membranaceous, mostly oval, serrate, with spreading teeth and partly straight veins. 8. V. ERUBESCENS.
Panicles few-flowered; leaves chartaceous, generally elliptic-lanceolate, sharply serrate, with incurved teeth and anastomosing veins. 9. V. OLIGANTHUM.
Leaves obtuse, oval, entire or crenately serrate, persistent; panicles short and dense; flowers sessile. 10. V. SUSPENSUM.

1. VIBURNUM FRAGRANS, Bunge, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ii. 107 (1833); *Enum. Pl. Chin. Bor.* 33. — Walpers, *Rep.* ii. 451. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 485; *Mél. Biol.* x. 659. — Hemsley, *Jour. Linn. Soc.* xxiii. 352.

China: Chili and Kansu (ex Hemsley).

This species was first described and figured in 1768 by J. G. Gmelin in his *Flora Sibirica*, iii. 135, t. 25, as Lonicera.

2. VIBURNUM NERVOSUM, Don, *Prodr. Fl. Nepal.* 141 (1824). — De Candolle, *Prodr.* iv. 327. — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 178. — Brandis, *Forest Fl. Brit. Ind.* 259; *Indian Trees*, 363, f. 152. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 8. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, viii. 252; *Pl. David.* i. 69. — Gräbner, *Engler Bot. Jahrb.* xxix. 587.

Viburnum grandiflorum, Wallich, ex De Candolle, *Prodr.* iv. 329 (1830).

Solenotinus nervosus, Oersted, *Vidensk. Medd. fra Nat. For. Kjöbenh.* xii. 295 (1860).

China: Szech'uan, Mupin (ex Franchet); also on the Himalayas.

3. VIBURNUM YUNNANENSE, *n. sp.*

Leaves deciduous, oval to oval-oblong or oblong-obovate, obtuse at the apex, rounded or narrowed at the base, crenately se

except the lower third, dull green and glabrous with the exception of a few hairs along the veins on the upper surface, pale green and covered with minute whitish glands on the lower surface, and from 3 to 6 centimetres long (only partly grown), with five or six pairs of veins fasciculate-pilose beneath; petioles grooved above, about 1 centimetre in length, densely fasciculate-pubescent. Panicles terminal and lateral, on short two-leaved branchlets, long-stalked, rather dense and nearly hemispherical, from 3 to 5 centimetres in diameter, with opposite ramifications subtended by lanceolate ciliate bracts; peduncle from 2 to 3 centimetres in length and, like the whole inflorescence, densely fasciculate-pubescent; ovary slightly glandular; calyx-teeth orbicular-ovate, sparingly ciliate; corolla rotate, glabrous, about 5 millimetres in diameter, the lobes orbicular-ovate; stamens not exceeding the corolla; anthers oval, yellow; style short and thick, about equaling the calyx-teeth. Fruits unknown.

A shrub (or tree ?), with generally forked somewhat tortuous branches, and densely fasciculate-pubescent branchlets, becoming light yellowish gray in their second year and later grayish brown. Winter-buds small, probably with two outer scales. Flowers appear with the leaves.

China: Yunnan, Mengtze, mountain forest, altitude 2300 metres, *A. Henry* (No. 11015 in Herb. Arnold Arboretum).

Viburnum yunnanense is closely related to *Viburnum Sieboldii*, Miquel, which differs from it chiefly in its much larger more coarsely serrate leaves, with from eight to twelve pairs of veins, and in its larger glabrous or nearly glabrous inflorescence borne on branchlets furnished with two or three pairs of leaves.

4. VIBURNUM SIEBOLDII, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 267 (1866); *Prol. Fl. Jap.* 155. — Franchet & Savatier, *Enum. Pl. Jap.* i. 201. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 485; *Mél. Biol.* x. 666. — Sargent, *Garden and Forest*, ii. 556, f. 145. — Dippel, *Handb. Laubholzk.* i. 190, f. 119. — Koehne, *Deutsche Dendr.* 536. — Shirasawa, *Icon. Ess. Fl. Jap.* i. 130, t. 86, f. 17–32. — Rehder, *Bailey Cycl. Am. Hort.* iv. 1924, f. 2661.

Japan: Hondo, Fuji-san, 1891, *K. Watanabe*, Otome-togi, Hakone mountains, 1892, *C. S. Sargent*, Mt. Chokaizan, 1892, *J. H. Veitch*, Akita, 1904, *U. Faurie* (No. 5982 in Herb. Arnold Arboretum); Kiu-siu, Kundsho-san, 1863, *Maximowicz*. Often cultivated as an ornamental shrub.

The specimen collected by Faurie "in humidis Akita" differs in its very large leaves perfectly glabrous except the bearded axils of the veins and in its very large and lax corymbs. A form known only in cultivation is var. *reticulatum*, Rehder, *Bailey Cycl. Am. Hort.* iv. 1924 (1902) (*V. reticulatum*, Hort.); this is smaller in all its parts and has nearly glabrous leaves. A form with variegated leaves, var. *variegatum*, Hort., is sometimes cultivated.

5. VIBURNUM HENRYI, Hemsley. See p. 35, t. 116.

6. VIBURNUM ODORATISSIMUM, Ker, *Bot. Reg.* vi. t. 456 (1820). — De Candolle, *Prodr.* iv. 326. — Drapiez, *Herb. Amat.* iv. t. 253. — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. iii. 173. — Bentham, *Fl. Hongkong*, 143. — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 268; *Prol. Fl. Jap.* 156. — Franchet & Savatier, *Enum. Pl. Jap.* i. 201. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 478; *Mél. Biol.* x. 649. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 7. — Hemsley, *Jour. Linn. Soc.* xxiii. 354. — Dippel, *Handb. Laubholzk.* i. 199, f. 127. — Shirasawa, *Icon. Ess. Fl. Jap.* i. 132, t. 88, f. 1–9. — Brandis, *Indian Trees*, 362. — Matsumura & Hayata, *Jour. Coll. Sci. Tokyo* (*Enum. Pl. Formosa*), xxii. 180.

Viburnum chinense, Zeyher, *Verz. Gew. Schwetzingen*, 198 (*nomen nudum*) (1819). — Steudel, *Nomencl.* 880 (1821).

Viburnum fragrans, Loiseleur-Deslongchamps, *Herb. Gén. Amat.* vii. t. 466 (1824).

Viburnum sinense, Colla, *Hort. Ripul.* 145 (1824).

Thyrsosma chinensis, Rafinesque, *Sylva Telluriana*, 130 (1838).

Viburnum japonicum, Jacques, *Jour. Soc. Hort. France*, iv. 598 (not Sprengel) (1858).

Microtinus odoratissimus, Oersted, *Vidensk. Medd. fra Nat. For. Kjöbenh.* xii. 294, t. 6, f. 7–10 (1860).

Viburnum Awabucki, K. Koch, *Wochenschr. Gaertn. Pflanzenk.* x. 108 (1867).

Viburnum odoratissimum, var. *Awabucki*, Zabel, *Rümpler Ill. Gartenbau-Lex.* ed. iii. 877 (1902).

Japan: Hondo, Yokohama, 1862, *Maximowicz;* Kiu-siu, Nagasaki, 1862, *R. Oldham;* Liu-kiu Islands, 1853–56, *C. Wright* (No. 106), Yakushima, 1900, *U. Faurie* (No. 3989 in Herb. Arnold Arboretum). Korean Archipelago: Quelpart Island, 1906, *U. Faurie* (No. 677 in Herb. Arnold Arboretum). Formosa: Bankinsing, *A. Henry* (Nos. 67, 75, 139). China: Hongkong, *C. Wilford, C. Wright;* Fokien, *Swinhoe* (ex Hemsley). Also on the Khasia Hills, India, and in the Philippine Islands; often cultivated in temperate regions and as a greenhouse shrub in cold climates.

The northern form, which has the tube of the corolla longer than the limb, has been distinguished by Koch as *Viburnum Awabucki*, but it is hardly well marked enough to deserve varietal rank.

7. VIBURNUM BRACHYBOTRYUM, Hemsley, *Jour. Linn. Soc.* xxiii. 349 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 587.

China: Hupeh, Ichang, *A. Henry* (Nos. 3324 ex Hemsley, 628, 7302).

8. VIBURNUM ERUBESCENS, Wallich, *Pl. As. Rar.* ii. 29, t. 134 (1830). — De Candolle, *Prodr.* iv. 329. — Thwaites, *Enum. Pl. Zeylan.* 136. — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 177. — Brandis, *Forest Fl. Brit. Ind.* 258; *Indian Trees*, 363, f. 151. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 7. — Gräbner, *Engler Bot. Jahrb.* xxix. 584.

Viburnum Wightianum, Wallich, *Pl. As. Rar.* ii. 29 (1830). — Wight, *Icon.* t. 1024. — Wight & Arnott, *Prodr. Fl. Ind.* 388.

Viburnum pubigerum, Wight & Arnott, *Prodr. Fl. Ind.* 389 (1834).

Solenotinus erubescens, Oersted, *Vidensk. Medd. fra Nat. For. Kjöbenh.* xii. 395 (1860).

Viburnum Prattii, Gräbner, *Engler Bot. Jahrb.* xxix. 584 (1901).

China: Szech'uan, Ta-tsien-lu, *Pratt* (ex Gräbner), *A. Henry* (Nos. 5691, 5605 A), *E. H. Wilson* (No. 3734), Mt. Omei, *E. H. Wilson* (No. 5024); Hupeh, *A. Henry* (Nos. 6488, 6943), *E. H. Wilson* (No. 1382); Shensi, *G. Giraldi* (Nos. 1779, 2548, 2557, 2558 in Herb. Florence).

I cannot with Giraldi's specimens before me separate *Viburnum Prattii* from *Viburnum erubescens;* it seems to differ only in its larger flowers, for the leaves are hardly more pubescent than those of *Viburnum erubescens*, and a mere variation in the size of flowers is scarcely sufficient for specific distinction. I am unable to say if the Chinese *Viburnum erubescens* is identical with the

type, as I have not seen Wallich's specimens. The former differ certainly considerably from some of the Himalyan specimens in the texture and venation of the leaves.

9. VIBURNUM OLIGANTHUM, Batalin, *Act. Hort. Petrop.* xiii. 372 (1894). — Gräbner, *Engler Bot. Jahrb.* xxix. 584.

China: Szech'uan, *A. Henry* (No. 8934), Mt. Omei, *E. H. Wilson* (No. 522).

On Wilson's specimen the leaves are larger and usually serrate from near the base, and the inflorescence is nine to sixteen-flowered; it agrees otherwise with the type.

10. VIBURNUM SUSPENSUM, Lindley, *Jour. Hort. Soc. Lond.* viii. 130 (1853). — Jacques, *Jour. Soc. Hort. Paris*, vi. 410.

Viburnum Sandankwa, Hasskarl, *Retzia*, i. 37 (1856). — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 268; *Prol. Fl. Jap.* 156. — Walpers, *Ann.* v. 96. — Franchet & Savatier, *Enum. Pl. Jap.* i. 201. — *Bot. Mag.* ci. t. 6172. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 477; *Mél. Biol.* x. 649. — Hemsley, *Jour. Linn. Soc.* xxiii. 355. — Dippel, *Handb. Laubholzk.* i. 200, f. 128.

Japan: Liu-kiu Islands, 1853–56, *C. Wright*. This species is cultivated in Japan and Java, and was introduced into Europe about 1850 by Van Houtte of Ghent.

II. PSEUDOTINUS, Clarke.

Leaves deciduous, dentate or denticulate; corymbs sessile and terminal, or peduncled and lateral, with radiant flowers (except No. 11); drupes ovoid, purple or bluish black; stone with a deep ventral furrow; albumen deeply ruminate (except Nos. 14 and 15); shrubs with stellate tomentum; in their naked winter-buds and tomentum Nos. 11 to 13 show a close affinity to the following section, and in the furrowed and ruminate albumen to the preceding section, while Nos. 14 and 15 by their lateral corymbs show some relation to No. 40 of Section IV.

Albumen ruminate; corymbs terminal; winter-buds naked.
- Corymbs without radiant flowers; leaves deeply cordate, ovate to oblong-ovate. — 11. V. CORDIFOLIUM.
- Corymbs with radiant flowers.
  - Leaves deeply cordate at the base, broadly ovate; petioles not stipulate. — 12. V. FURCATUM.
  - Leaves usually rounded at the base, ovate to oblong-ovate; petioles stipulate. — 13. V. SYMPODIALE.

Albumen solid; corymbs lateral, with radiant flowers; winter-buds with one pair of scales.
- Leaves with five or six pairs of veins, obtusely serrate from near the middle; stamens slightly shorter than the corolla. — 14. V. HANCEANUM.
- Leaves with from eight to twelve pairs of veins, sharply serrate from near the base; stamens slightly longer than the corolla. — 15. V. TOMENTOSUM.

11. VIBURNUM CORDIFOLIUM, Wallich. See p. 81, t. 138.

12. VIBURNUM FURCATUM, Blume. See p. 41, t. 119.

13. VIBURNUM SYMPODIALE, Gräbner. See p. 83, t. 139.

14. VIBURNUM HANCEANUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 487 (1880); *Mél. Biol.* x. 662. — Koehne, *Deutsche Dendr.* 536.

Viburnum tomentosum, Hance, *Jour. Bot.* viii. 273 (not Thunberg) (1870).

China: Kwantung, Pakwan, hills above Canton, *Sampson* (Herb. Hance in Herb. St. Petersburg).

15. VIBURNUM TOMENTOSUM, Thunberg, *Fl. Jap.* 123 (not Lamarck) (1784). — De Candolle, *Prodr.* iv. 329. — Siebold & Zuccarini, *Fl. Jap.* i. 81, t. 37; *Abhand. Akad. Münch.* iv. pt. iii. 171. — Franchet & Savatier, *Enum. Pl. Jap.* i. 199. — Koch, *Dendr.* ii. pt. i. 58. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 486; *Mél. Biol.* x. 661. — Hemsley, *Jour. Linn. Soc.* xxiii. 356. — Dippel, *Handb. Laubholzk.* i. 174, f. 106. — Koehne, *Deutsche Dendr.* 536. — Sargent, *Garden and Forest*, iv. 594, f. 93, 94. — Shirasawa, *Icon. Ess. For. Jap.* i. 131, t. 86, f. 1–16. — Gräbner, *Engler Bot. Jahrb.* xxix. 588.

Viburnum plicatum, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266 (not Thunberg) (1866). — Schmidt, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, xii. pt. ii. 142. — Franchet & Savatier, *Enum. Pl. Jap.* i. 198. — Herder, *Bull. Soc. Nat. Mosc.* liii. pt. i. 11.

Viburnum dentatum, Thunberg, *Fl. Jap.* 122 (not Linnæus) (1784).

Viburnum dilatatum, var. *radiatum*, Gray ex Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 483 (1880); *Mél. Biol.* x. 657.

Viburnum plicatum, γ *tomentosum*, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266 (1866); *Prol. Fl. Jap.* 154.

Japan: Hondo, Tokio, 1883, *Kingo Miyabe*, Miyanoshita, 1892, *C. S. Sargent*; Shikoku, Nanokawa, Tosa, 1887 and 1888, *K. Watanabe*. China: Hupeh, *A. Henry* (Nos. 7418, 7654, 7654 B); *E. H. Wilson* (Nos. 355, 978 A); often cultivated.

VIBURNUM TOMENTOSUM, forma PLENUM, *comb. nov.*

Viburnum dentatum, Thunberg, *Fl. Jap.* 122 (not Linnæus) (1784).

Viburnum plicatum, Thunberg, *Trans. Linn. Soc.* ii. 332 (1794). — De Candolle, *Prodr.* iv. 329. — Siebold & Zuccarini, *Fl. Jap.* i. 81, t. 37. — Lindley, *Bot. Reg.* xxxiii. t. 51. — Oersted, *Vidensk. Medd. fra Nat. For. Kjöbenh.* xii. 32.

Viburnum plicatum (var. *dilatatum*), Lindley, *Paxton Brit. Fl. Gard.* i. 147, t. 29 (1850). — Lemaire, *Jard. Fleur.* i. t. 88.

Viburnum plicatum, δ *plenum*, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266 (1866); *Prol. Fl. Jap.* 154. — Franchet & Savatier, *Enum. Pl. Jap.* i. 200.

Viburnum tomentosum, γ *plicatum*, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 486 (1880); *Mél. Biol.* x. 662. — Dippel, *Handb. Laubholzk.* i. 174.

Viburnum tomentosum sterile, Zabel, *Beissner, Schelle & Zabel Handb. Laubholz.* 441 (1903).

Cultivated in China and Japan and introduced from there into European gardens. There is also a variegated form in cultivation.

VIBURNUM TOMENTOSUM, forma ROTUNDIFOLIUM, Hort. ex Rehder, *Bailey Cycl. Am. Hort.* iv. 1925 (as var.) (1902), differs slightly from the forma *plenum* in its earlier flowers and broader leaves.

VIBURNUM TOMENTOSUM, var. PARVIFOLIUM, *comb. nov.*

Viburnum cuspidatum, Thunberg, *Fl. Jap.* 125 (1784). — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. iii. 171.

Viburnum plicatum, β *parvifolium*, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266 (1866); *Prol. Fl. Jap.* 154. — Franchet & Savatier, *Enum. Pl. Jap.* i. 199.

Viburnum tomentosum, β *cuspidatum*, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 486 (1880); *Mél. Biol.* x. 662. — Dippel, *Handb. Laubholzk.* i. 174.

China: Szech'uan, *A. Henry* (No. 5720). Japan: Kiu-siu, Kundsho-san, and Volcano Wunzen, 1863, *Maximowicz*, Tasodake, 1899, *U. Faurie* (No. 3331 in Herb. Arnold Arboretum).

VIBURNUM TOMENTOSUM, var. LANCEATUM, *var. nov.*

Leaves of the flowering branches elliptic-ovate to elliptic-lanceolate, acute to acuminate, broadly cuneate or rounded at the base, sparingly stellate-pubescent beneath, glabrous or nearly so above, from 3.5 to 7 centimetres long and from 1.5 to 3 centimetres broad, with from six to nine pairs of veins; leaves of the shoots lanceolate, acuminate, from 5 to 10 centimetres long, more densely stellate beneath and covered while young with furcate hairs above, with fewer veins; petioles stellate-pubescent. Corymbs rather small and with few sterile flowers. Drupes 6 millimetres high. Young branchlets stellate-pubescent.

Japan: Hondo, near Nikkō (cultivated ?), September 8, 1892, C. S. Sargent. Cultivated at the Arnold Arboretum, where it was raised from seeds brought by Professor Sargent in 1892 from Japan.

This form differs from the type in its more pubescent narrower and smaller leaves, with fewer and less closely set veins, and from the var. *parvifolium* particularly in the leaves being gradually narrowed into the apex and not abruptly cuspidate.

III. LANTANA, De Candolle.

Leaves deciduous (persistent in Nos. 30–34), usually denticulate, without stipules; drupes black or bluish black; stone much flattened, with three ventral and two dorsal grooves sometimes obsolete; albumen solid; shrubs with stellate tomentum and naked winter-buds; easily distinguished from all other sections except the preceding section by its naked winter-buds and the usually copious stellate tomentum.

Leaves dentate or denticulate, deciduous.
- Veins of the leaves straight, ending in the teeth.
  - Corolla hypocraterimorphous, tube 1 centimetre long; stamens included; leaves broadly ovate, pubescent on both surfaces. 16. V. CARLESII.
  - Corolla rotate or rotate-campanulate.
    - Leaves pubescent on both surfaces, more densely beneath, cordate or subcordate; flowers mostly on rays of the third order.
      - Leaves ovate; corolla 6 millimetres in diameter, with oblong lobes. 17. V. VEITCHII.
      - Leaves lanceolate; corolla from 8 to 10 millimetres in diameter, with suborbicular lobes. 18. V. BUDDLEIFOLIUM.
    - Leaves glabrous above at maturity, sparingly stellate-pubescent beneath, usually rounded at the base, acute or obtusish; flowers on rays of the first and second order. 19. V. GLOMERATUM.
- Veins of the leaves anastomosing; leaves cuneate or rounded at the base.
  - Corolla rotate.
    - Corymbs without radiant flowers.
      - Flowers mostly on rays of the third order; ovary glabrous; stone convex on the dorsal side; corymbs usually short-stalked; leaves mostly obtuse. 20. V. SHENSIANUM.
      - Flowers mostly on rays of the second order; stone equally flattened and grooved on both sides; leaves acute, cuneate at the base.
        - Leaves sparingly stellate-pubescent above; corymbs many-flowered. 21. V. BUREJÆTICUM.
        - Leaves glabrous above; corymbs few-flowered. 22. V. ARCUATUM.
    - Corymbs with radiant flowers, short-stalked; leaves obtuse, sparingly pubescent on both surfaces. 23. V. MACROCEPHALUM.
  - Corolla cylindric or campanulate (unknown in No. 25).
    - Leaves obtuse or acutish.
      - Drupe ovoid, 7 millimetres long; leaves from 4 to 6 centimetres in length; corolla cylindric; flowers on rays of the first order. 24. V. MONGOLICUM.
      - Drupe oblong, 10 millimetres long; leaves from 4 to 9 centimetres in length; flowers on rays of the second order. 25. V. BITCHIUENSE.
    - Leaves acuminate; corolla campanulate; stamens slightly exserted. 26. V. URCEOLATUM.

Leaves entire or sometimes obscurely or remotely denticulate, with the veins anastomosing, mostly persistent.
- Leaves not impressed-reticulate above, rounded or narrowed at the base.
  - Leaves deciduous, chartaceous or membranaceous.
    - Leaves densely white-tomentose beneath, from 6 to 10 centimetres long; corolla and ovary sparingly stellate. 27. V. HYPOLEUCUM.

Leaves grayish tomentose beneath, sometimes only sparingly so, from 3 to 6 centimetres long (flowers unknown).
Leaves lustrous above, glabrous or nearly so; rays thin, slender. 28. V. BOCKII.
Leaves dull above, with scattered furcate hairs and slightly impressed veins; rays thick and angled. 29. V. FALLAX.

Leaves coriaceous, persistent, from 3 to 6 centimetres long, with a whitish or yellowish tomentum beneath; ovaries glabrous.
Corolla infundibuliform, with the limb shorter than the tube, about 5 millimetres broad; corymb from 2 to 3 centimetres wide. 30. V. CONGESTUM.
Corolla campanulate-rotate, from 7 to 9 millimetres broad; corymb usually from 5 to 7 centimetres wide. 31. V. UTILE.

Leaves reticulate-impressed above, coriaceous, rounded or cordate at the base, ovate to oblong-ovate, from 6 to 8 centimetres long; ovaries stellate-tomentose.
Leaves usually rounded at the base, densely grayish tomentose beneath, with the rays of the stellate hairs not exceeding 0.3 millimetre in length; corymbs short-stalked, small and dense. 32. V. CHINSHANENSE.
Leaves usually cordate at the base, densely covered beneath with yellowish matted hairs, their rays from 0.3 to 0.6 millimetre long; corymbs long-stalked. 33. V. ROSTHORNII.
Leaves ovate-lanceolate, from 10 to 18 centimetres long, subcordate at the base, deeply wrinkled above and densely yellowish tomentose beneath; corymbs from 8 to 12 centimetres broad. 34. V. RHYTIDOPHYLLUM.

16. VIBURNUM CARLESII, Hemsley, *Jour. Linn. Soc.* xxiii. 350 (1888). — Palibin, *Act. Hort. Petrop.* xvii. 102. — Unger, *Moeller's Deutsch. Gärtn.-Zeit.* xvii. 271, f. — *Gard. Chron.* ser. 3, xxxii. 261, f. — *Bot. Mag.* t. 8114. — Tusschenwater, *Rev. Hort. Belg. Étrang.* xxxiii. 357, t.

Korea: Chemulpo, *W. R. Carles* (No. 19 in Herb. Kew); western Korea, *Perry* (No. 61 in Herb. Kew); introduced into gardens in 1902 by A. Unger, the Yokohama nurseryman.

17. VIBURNUM VEITCHII, C. H. Wright, *Gard. Chron.* ser. 3, xxxiii. 257 (1903).

China: western Hupeh, *E. H. Wilson* (No. 2107 ex Wright); western China, *E. H. Wilson* (No. 3731); cultivated in the Veitchian nurseries.

18. VIBURNUM BUDDLEIFOLIUM, C. H. Wright, *Gard. Chron.* ser. 3, xxxiii. 257 (1903).

China: western Hupeh, *E. H. Wilson* (No. 1863 ex Wright).

19. VIBURNUM GLOMERATUM, Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 483 (1880); *Mél. Biol.* x. 656. — Hemsley, *Jour. Linn. Soc.* xxiii. 352.

China: Kansu, Wu-ping, 1885, *G. N. Potanin* (Herb. St. Petersburg).

There is another fruiting specimen in the St. Petersburg herbarium collected by Potanin in northern Szech'uan which differs in its longer-stalked many-flowered and larger corymbs measuring from 6 to 7 centimetres in diameter, and slightly in the foliage. Additional flowering material may show that this specimen represents another species.

20. VIBURNUM SHENSIANUM, Maximowicz. See p. 85, t. 140.

21. VIBURNUM BUREJÆTICUM, Regel & Herder, *Gartenflora*, xi. 47, t. 384 (1862). — Herder, *Bull. Soc. Nat. Mosc.* xxxvii. pt. i. 196, t. 1, f. a–d; *Pl. Radd.* iii. 7, t. 1, f. a–d. — Koch, *Dendr.* ii. pt. i. 55. — Baker & S. Moore, *Jour. Linn. Soc.* xvii. 383. — Koehne, *Deutsche Dendr.* 535.

Viburnum davuricum, Maximowicz, *Mém. Sav. Étr. Acad. Sci. St. Pétersbourg*, ix. 135 (*Prim. Fl. Amur.*) (not Pallas) (1859). — Regel, *Mém. Acad. Sci. St. Pétersbourg*, sér. 7, iv. No. iv. 75 (*Tent. Fl. Ussur.*).

Viburnum burejanum, Herder, *Bull. Soc. Nat. Mosc.* liii. pt. i. 11 (1878); *Pl. Radd.* addit. 11. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 481; *Mél. Biol.* x. 653. — Hemsley, *Jour. Linn. Soc.* xxiii. 350. — Dippel, *Handb. Laubholzk.* i. 185, f. 116.

Eastern Siberia: Manchuria, "mont. Burejæ," *G. Radde;* Ussuri, *Maack;* Amurland, *S. Korshinski.* China: western Hupeh, *E. H. Wilson* (No. 1863); cultivated in the Veitchian nurseries.

22. VIBURNUM ARCUATUM, Komarov, *Act. Hort. Petrop.* xviii. 427 (1901).

Korea: banks of the Czan-dshin-gan River (ex Komarov).

23. VIBURNUM MACROCEPHALUM, Fortune, *Jour. Hort. Soc. Lond.* ii. 244 (*sensu* Maximowicz) (1847). — Maximowicz, *Bull. Soc. Nat. Mosc.* liv. 24 (1879); *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 480; *Mél. Biol.* x. 652. — Hemsley, *Jour. Linn. Soc.* xxiii. 394. — Dippel, *Handb. Laubholzk.* i. 177, f. 108. — Koehne, *Deutsche Dendr.* 535. — Gräbner, *Engler Bot. Jahrb.* xxix. 587.

Viburnum Keteleeri, Carrière, *Rev. Hort.* 1863, 269, f. 31. — *The Garden*, vii. 287, f.

Viburnum arborescens, Hemsley, *Jour. Linn. Soc.* xxiii. 349 (1888). — Gräbner, *Engler Bot. Jahrb.* xxix. 588.

Viburnum macrocephalum, var. *Keteleeri*, Nicholson, *Ill. Dict. Gard.* iv. 155, f. 168 (1889).

China: Kiangsu, Faber; Chekiang and Fokien, *Fortune* (ex Hemsley); Hupeh, *A. Henry* (Nos. 3810 and 7661 in Herb. Kew, 4643); *E. H. Wilson* (No. 219); sometimes cultivated. I am unable to find any differences between the typical *Viburnum macrocephalum* and *Viburnum arborescens* based on Henry's No. 3810, which, as the flowers are not fully developed, has small sterile flowers.

VIBURNUM MACROCEPHALUM, forma STERILE, Dippel, *Handb. Laubholzk.* i. 178 (as var.) (1889).

Viburnum macrocephalum, Fortune, *Jour. Hort. Soc. Lond.* ii. 244 (*sensu stricto*) (1847). — Lindley, *Bot. Reg.* xxxiii. t. 43. — Lemaire, *Fl. des Serres*, iii. 263, t. — Walpers, *Ann.* i. 365. — Carrière, *Rev. Hort.* 1858, 349, f. 99. — Koch, *Dendr.* ii. pt. i. 57.

Viburnum Keteleeri macrocephalum, Carrière, *Rev. Hort.* 1863, 271.

A garden form introduced from China by Fortune, and the real type of his species; formerly sometimes cultivated under the name of *Viburnum Fortunei* ex Nicholson, *Ill. Gard. Dict.* iv. 155 (1889).

24. VIBURNUM MONGOLICUM, *n. comb.*

Lonicera mongolica, Pallas, *Reise Russ. Reich.* iii. 721 (excl. syn. Gmelin) (1771); *Fl. Ross.* i. 59.

Lonicera davurica, Pallas, *Fl. Ross.* i. t. 38 (1784).

Viburnum davuricum, Pallas, *Ft. Ross.* ii. 30 (1788). — De Candolle, *Prodr.* iv. 328. — Ledebour, *Fl. Ross.* ii. 386. — Herder, *Bull. Soc. Nat. Mosc.* xxxvii. pt. i. 200, t. 1, f. 2ᵉ; liii. 11; *Pl. Radd.* iii. 11, t. 1, f. 2ᵉ; addit. 11. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg,* xxvi. 481; *Mél. Biol.* x. 654. — Franchet, *Nouv. Arch. Mus. Paris,* sér. 2, vi. 29; *Pl. David.* i. 149.

41 — *Viburnum dahuricum*, Dippel, *Handb. Laubholzk.* i. 198, f. 126. — Koehne, *Deutsche Dendr.* 535.

Siberia: Dahuria, *Sosnin;* Amurland, *Maximowicz.* China: Chili and Shingking (ex Hemsley); Kansu (ex Maximowicz); cultivated.

VIBURNUM BITCHIUENSE, Makino, *Bot. Mag. Tokio,* xvi. 156 (1902).

53: prov. Bitchu, Kawanose in Hongo-mura, *Z. Yoshino* (ex Makino).

Chi plant I have seen no specimen, but from the description it seems related to the preceding species.

Vi BURNUM URCEOLATUM, Siebold & Zuccarini. See p. 87, t. 141.

genera URNUM HYPOLEUCUM, *n. sp.*

54. deciduous, lanceolate-oblong or narrow oblong, acutish, rounded at the base, entire or remotely and obscurely denticu-

Lea green, dull and glabrous on the upper surface, densely covered with a white and close stellate tomentum on the lower fa- rom 5 to 10 centimetres long and from 1.5 to 4 centimetres broad, with from seven to ten pairs of veins curving and anastomosing before reaching the margins and slightly impressed above and elevated beneath; petioles grooved, about 1 centimetre in length, densely stellate-tomentose. Corymbs terminal, from 4 to 5.5 centimetres in diameter, densely stellate-tomentose, on a peduncle about 2.5 centimetres long; rays usually seven, of nearly equal length; flowers short-pedicellate, with linear-lanceolate bractlets at the base, on rays of the second and third order; ovary oblong-ovoid, nearly 3 millimetres long, sparingly stellate like the broadly ovate calyx-lobes; corolla rotate-campanulate, nearly 5 millimetres high, sparingly stellate outside, the lobes orbicular, shorter than the tube; stamens exceeding the lobes; anthers oval, yellow; style slightly exceeding the calyx-lobes. Drupe oblong-ovoid, crowned by the persistent calyx; stone much compressed, 8 millimetres high and 5 millimetres broad, with three ventral and two dorsal grooves.

A shrub, about 1 metre high, with terete branches, loosely stellate-tomentose while young, soon becoming glabrous, and light yellowish brown and marked by scattered small lenticels. Winter-buds naked.

China: banks of the Yang-tse-kiang River, Kiu Fu, *E. H. Wilson* (No. 3726 in Herb. Arnold Arboretum).

Viburnum hypoleucum is most closely related to *Viburnum Bockii*, Gräbner, but is easily distinguished from that species by the pure white tomentum on the under surface of the much larger leaves.

28. VIBURNUM BOCKII, Gräbner, *Engler Bot. Jahrb.* xxix. 585 (1901).

China: Szech'uan, Tsaku-lao, La-ma-ssu, *A. von Rosthorn* (No. 2559 a in Herb. Christiania).

29. VIBURNUM FALLAX, Gräbner, *Engler Bot. Jahrb.* xxix. 586 (1901).

China: Szech'uan, Nan-chuan, *A. von Rosthorn* (No. 505 in Herb. Christiania).

30. VIBURNUM CONGESTUM, *n. sp.*

Leaves coriaceous, oval to elliptic-ovate, obtuse or acutish, rounded or narrowed at the base, entire, dark yellowish green, furnished while very young with scattered stellate hairs but soon becoming glabrous on the upper surface, covered on the lower surface with grayish white or yellowish white stellate tomentum, from 2 to 4 centimetres long, with only slightly impressed veins; petioles densely tomentose, from 0.5 to 1 centimetre in length. Corymbs terminal and lateral, small and dense, from 2 to 3 centimetres in diameter, on peduncles from 5 to 10 millimetres long and like the rays stellate-tomentose; rays five, short and angular; flowers sessile on rays of the first and second order; ovary and the broadly ovate short calyx-lobes gla- lls campanulate-infundibuliform, 5 millimetres high, glabrous, the lobes orbicular-ovate, about half as long as the tube; stamens about as long as the lobes; anthers oval, yellow; style exceeding the calyx-lobes. Fruit unknown.

A shrub, about 1.30 metres high (according to A. Henry), with branchlets densely covered with grayish white stellate tomentum, more or less persistent until their third year. Winter-buds naked.

China: Yunnan, Mengtze, woods, altitude 1600 metres, *A. Henry* (No. 9683 A in Herb. Kew, type); Tapin-tze, Delavay (No. 929 in Herb. Kew).

Viburnum congestum is most closely related to *Viburnum utile*, Hemsley, differing chiefly from that species in its smaller infundibuliform corolla, the dense and small inflorescence, and the absence of fulvous scales in the tomentum. It seems a rather variable species: Henry's specimen No. 9683 A in the herbarium of the Arnold Arboretum differs from the type at Kew in its larger leaves only thinly covered with stellate tomentum on the lower surface, while Delavay's specimen has larger acutish leaves covered beneath with a close yellowish or grayish white tomentum, and a somewhat less dense corymb.

31. VIBURNUM UTILE, Hemsley. See p. 89, t. 142.

32. VIBURNUM CHINSHANENSE, Gräbner, *Engler Bot. Jahrb.* xxix. 586 (1901).

China: Szech'uan, Kin-shan, Hou-tsao-kou, *A. von Rosthorn* (No. 165 in Herb. Christiania).

33. VIBURNUM ROSTHORNII, Gräbner, *Engler Bot. Jahrb.* xxix. 586 (1901).

China: Szech'uan, Wei-kuan valley, *A. von Rosthorn* (No. 2548 in Herb. Christiania).

For *Viburnum Rosthornii*, var. *xerocarpa*, see *Viburnum Henryi*, p. 35.

34. VIBURNUM RHYTIDOPHYLLUM, Hemsley. See p. 39, t. 118.

IV. MEGALOTINUS, Maximowicz.

Leaves entire (denticulate in Nos. 37 and 40), with anastomosing veins, without stipules; drupe bluish black or purple, ovoid to oblong; stone compressed, slightly grooved or sometimes with a median dorsal groove and two ventral grooves; albumen solid (except in No. 37); glabrescent shrubs; winter-buds with one pair of scales; a rather heterogenous group which shows in some species a close relation to the preceding section and in others to the two following sections.

Corolla campanulate, with upright short lobes; fruit ovoid, black; leaves coriaceous, entire or remotely toothed near t[illegible]
- Leaves lustrous above, from 8 to 15 centimetres long; corymbs glabrous; a tree. 35. V. CYLINDRICUM.
- Leaves dull above, from 4 to 8 centimetres long; corymb pubescent; a shrub. 36. V. CRASSIFOLIUM.

Corolla rotate; fruit purple.
- Corymbs pyramidal in outline; the central ray elongated, with several tiers of umbels; stone oblong, with two deep on the ventral side; albumen ruminate; leaves large, chartaceous, remotely toothed. 37. V. PYRAMIDATUM.
- Corymbs umbelliform, with the rays of equal length, or the central one shorter; albumen solid.
  - Leaves entire.
    - Corymbs sessile, from 12 to 17 centimetres broad; leaves large, oblong, chartaceous, often in threes. 38. V. TERNATUM.
    - Corymbs stalked; leaves ovate, opposite, lepidote beneath and setose on the veins. 39. V. SETIGERUM.
  - Leaves denticulate, large, with the veins partly ending in the teeth; corymbs lateral, long-stalked. 40. V. AMPLIFOLIUM.

35. VIBURNUM CYLINDRICUM, Hamilton. See p. 91, t. 143.

36. VIBURNUM CRASSIFOLIUM, *n. sp.*

Leaves coriaceous, elliptic, acutish and usually twisted at the apex, broadly cuneate at the base, entire, yellowish green and glabrous on the upper surface, lighter green, with scattered brown minute glands and axillary tufts of fascicled hairs on the lower surface, from 4 to 7.5 centimetres long and from 2.5 to 3.5 centimetres broad, with four or five pairs of curving and anastomosing veins slightly impressed above and elevated beneath; petioles stout, from 1 to 1.5 centimetres in length, glabrous or sparingly hairy, reddish. Corymbs terminal, from 4 to 5 centimetres in diameter, on angular peduncles, from 1 to 1.5 centimetres long, fasciculate-pilose; rays seven, angular, loosely covered with fascicled hairs. Flowers unknown. Drupes on rays of the second order, sessile, bluish black, ovoid, 5 millimetres high, crowned by the persistent calyx; stone slightly compressed, with one slight ventral furrow and two slight dorsal furrows.

A shrub, about 1 metre high, with upright angular branches fasciculate-pilose during their first season, becoming glabrous and grayish or reddish brown the following year. Winter-buds with one pair of scales.

China: Yunnan, Mengtze, on grass-covered mountains, altitude from 1800 to 2000 metres, *A. Henry* (No. 9797 in Herb. Arnold Arboretum).

Viburnum crassifolium seems most closely related to *Viburnum cylindricum*, Hamilton, but is easily distinguished from that species by the pubescent inflorescence, the smaller dull green leaves, and shrubby habit.

37. VIBURNUM PYRAMIDATUM, Rehder. See p. 93, t. 144.

38. VIBURNUM TERNATUM, Rehder. See p. 37, t. 117.

39. VIBURNUM SETIGERUM, Hance, *Jour. Bot.* xx. 261 (1882). — Hemsley, *Jour. Linn. Soc.* xxiii. 356.

China: Szech'uan, Mount Koloshan, *W. Mesny* (ex Hance).

This species is only known from Hance's specimen, which I have not seen; its nearest connection seems to be with the Indian *Viburnum punctatum*, Hamilton, or possibly with *Viburnum fœtidum*, Wallich.

40. VIBURNUM AMPLIFOLIUM, *n. sp.*

Leaves membranaceous, oval or ovate to elliptic-ovate, acuminate, rounded or broadly cuneate at the base, dentate from near the base, with from seven to nine pairs of veins partly anastomosing and partly ending in the teeth, dark yellowish green and roughened with minute tubercles bearing caducous furcate hairs, on the upper surface, lighter green and glabrous with the exception of sparse stellate hairs on the veins and veinlets on the lower surface, from 8 to 14 centimetres long and from 6 to 8.5 centimetres broad; petioles grooved, from 1.5 to 2 centimetres in length, yellowish stellate-tomentose. Corymbs on lateral two-leaved branchlets, from 7 to 9 centimetres in diameter, on slender peduncles from 4 to 5 centimetres long, and covered like the rays with stellate tomentum; rays four to six, slender, about 2.5 centimetres in length. Flowers unknown. Drupes on rays of the second and third order, ovoid-oblong, about 8 millimetres long and 5 millimetres broad, crowned by the persistent calyx; style cylindric, exceeding the ovate or oval-oblong calyx-lobes, persistent; stone with a deep dorsal furrow and two slight ventral furrows.

A shrub, from 3 to 4 metres high, with terete branches loosely covered with a yellowish stellate tomentum while young, and becoming glabrous and light brownish yellow in their second year. Winter-buds with one pair of stellately pubescent scales.

China: Yunnan, Mengtze, on the southeastern mountains, altitude 2000 metres, *A. Henry* (No. 13470 in Herb. Arnold Arboretum and in Herb. Kew).

Viburnum amplifolium is most nearly related to *Viburnum Colebrookianum*, Wallich, but is easily distinguished from that species by the leafy flowering branchlets, by the larger fruits, and by the different venation of the leaves.

V. TINUS, Maximowicz.

Leaves persistent, entire or only occasionally toothed, three-nerved at the base (in the Chinese species), with anastomosing veins, without stipules; drupe bluish black, globose-ovoid, without grooves; albumen deeply ruminate; glabrous shrubs; winter-buds with one pair of scales.

Leaves wrinkled above, from 6 to 12 centimetres long; corymbs dense, from 4 to 6 centimetres broad; drupes 6 millimetres high. 41. V. DAVIDI.

Leaves smooth above; corymbs lax.

Corymbs from 10 to 16 centimetres broad; drupes 4 millimetres high; leaves from 6 to 12 centimetres long. 42. V. CINNAMOMIFOLIUM.

Corymbs from 3 to 6 centimetres broad; drupes 5 to 6 millimetres high; leaves from 4 to 6 centimetres long, often remotely toothed. 43. V. PROPINQUUM.

41 VIBURNUM DAVIDI, Franchet, *Nouv. Arch. Mus. Hist. Nat. Paris*, sér. 2, viii. 251 (1885); *Pl. David.* ii. 69.
an: Mupin, *A. David* (ex Franchet); western China, *E. H. Wilson* (No. 3728).
IURNUM CINNAMOMIFOLIUM, Rehder. See p. 31, t. 114.
*Vi*URNUM PROPINQUUM, Hemsley. See p. 33, t. 115.
Chin
53. V
Chin

VI. ODONTOTINUS, *n. sect.*

*Vibur*leciduous (except in Nos. 44, 46, and 54), dentate, with straight veins (except No. 44); drupes bright red, ovoid or generally stone compressed, with three ventral and two dorsal furrows often obsolete; albumen solid; shrubs, usually with
54. V pubescence; winter-buds with two pairs of scales; chiefly distinguished from the other sections by its winter-buds
Leaveairs of scales, the bright red drupes, and the straight-veined dentate leaves; *Viburnum dilatatum*, Thunberg, may serve
fascicle of this section.
lower
oles without stipules.

Leaves three-nerved at the base, with only three or four pairs of veins; ovaries glabrous.

Stone concave on the ventral side; leaves usually entire, coriaceous; corymbs and branchlets usually glabrous. 44. V. SEMPERVIRENS.

Stone slightly convex on both sides; leaves with a few coarse teeth near the apex; corymbs and branchlets pubescent. 45. V. FŒTIDUM.

Leaves with five or more pairs of veins, the basal ones not more developed than the others, dentate.

Corymbs and branchlets glabrous, the leaves with only a few long hairs on the veins beneath or quite glabrous.

Leaves broadest near the base.

Leaves persistent, ovate, quite glabrous, obscurely and remotely dentate. 46. V. JAPONICUM.

Leaves deciduous, distinctly and closely dentate.

Petioles about 1 centimetre long; leaves from 6 to 12 centimetres in length; stamens half as long or as long as the corolla. 47. V. THEIFERUM.

Petioles very short; leaves from 4 to 5 centimetres long; stamens very short, the filaments scarcely longer than the anthers; corymbs few-flowered. 48. V. PHLEBOTRICHUM.

Leaves broadest above the middle, at least those below the corymb; stamens much longer than the corolla; corymb large. 49. V. WRIGHTII.

Corymbs, branchlets, and leaves more or less pubescent.

Leaves, at least those below the corymb, broadest above the middle, pubescent on both surfaces; stamens longer than the corolla.

Petioles, peduncles, and branchlets covered with pale villous hairs; fruits about 5 millimetres long. 50. V. DILATATUM.

Petioles, peduncles, and branchlets covered with long hispid fulvous hairs; fruits about 7 millimetres long; corymbs rather small. 51. V. CORYLIFOLIUM.

Leaves broadest near the base.

Corymbs on peduncles from 1 to 3 centimetres long.

Leaves broadly cuneate at the base, glabrous or nearly so on the upper surface.

Leaves elliptic-lanceolate, long-acuminate, from 5 to 10 centimetres long; corolla slightly pubescent. 52. V. MULLAHA.

Leaves rhombic-ovate to elliptic-ovate, acute, from 5 to 6 centimetres long; corolla densely pubescent. 53. V. FORDIÆ.

Leaves rounded at the base, ovate, pubescent on the upper surface (sometimes glabrous in No. 56).

Leaves coriaceous, densely pubescent on the lower surface, slightly pubescent on the upper surface, acute; corymbs covered with spreading yellowish brown hairs. 54. V. HIRTULUM.

Leaves membranaceous, loosely covered on the upper surface with simple or furcate hairs, glabrous on the lower surface with the exception of the simple hairs on the veins; corymbs covered with velutinous pale yellow pubescence. 55. V. WILSONI.

Corymbs short-stalked or nearly sessile, terminal and often also lateral; stamens shorter than the corolla; leaves ovate. 56. V. LUZONICUM.

Petioles stipulate.

Petioles from 1 to 3 centimetres long; flowers on rays of the third and fourth order.

Leaves glabrous or pubescent only on the veins beneath.

Stamens shorter than the corolla; ovaries pubescent; leaves ovate, pilose on the veins beneath; petioles hardly more than 1 centimetre in length; corymbs short-stalked. 57. V. OVATIFOLIUM.

Stamens longer than the corolla; petioles about 2 centimetres in length.

Corolla glabrous.

Corymbs usually short-stalked, large and lax; leaves rhombic-ovate to ovate-oblong, mostly broadly cuneate at the base, chartaceous. 58. V. BETULIFOLIUM.

Corymbs usually long-stalked; leaves broadly ovate to obovate, sharply dentate, membranaceous. 59. V. LOBOPHYLLUM.

Corolla and ovary densely tomentose; leaves generally ovate to oblong-ovate, with remote subulate tee 60. V. DASYANTHUM deep

Leaves pubescent on both surfaces, broadly ovate; corymbs coated with close villous pubescence. TUM. 61. V. HUPEHENSE.

Petioles less than 1 centimetre long; leaves more or less pubescent.

Stamens shorter than the corolla; ovary tomentose; corymbs small, few-flowered. 62. V. ICHANGENSE.

Stamens longer than the corolla; ovaries glabrous; corymbs many-flowered, from 4 to 8 centimetres broad. 63. V. EROSUM.

44. VIBURNUM SEMPERVIRENS, K. Koch. See p. 95, t. 145.

45. VIBURNUM FŒTIDUM, Wallich, *Pl. As. Rar.* i. 49, t. 61 (1830). — De Candolle, *Prodr.* iv. 325. — Hooker f. & IUM. *Jour. Linn. Soc.* ii. 175. — Kurz, *Forest Fl. Brit. Burm.* ii. 2. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 4. — Brandis, *Indian T*

Viburnum premnaceum, Wallich ex De Candolle, *Prodr.* iv. 325 (1830).

Viburnum Jacquemontii, Planchon, *Hort. Donat.* 29 (1854–58). sh green and

Viburnum fœtidum, var. *premnaceum*, Oersted, *Vidensk. Medd. fra Nat. For. Kjöbenh.* xii. 298 (1860). — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 4. lower g

Viburnum pallidum, Franchet, *Jour. de Bot.* x. 308 (1896).

Viburnum ceanothoides, C. H. Wright, *Kew Bull. Misc. Inform.* 1896, 23.

China: Yunnan, Mengtze, altitude 1700 metres, *A. Henry* (No. 9244); Feng-chen-lin, altitude 1700 metres, *A. Henry* (No. 9244 A); also on the Khasia mountains, India, and in Assam.

VIBURNUM FŒTIDUM, var. RECTANGULUM, *n. var.*

Viburnum rectangulum, Gräbner, *Engler Bot. Jahrb.* xxix. 588 (1901).

This variety differs from the type chiefly in its nearly sessile corymbs and in its lanceolate or obovate-lanceolate acute leaves. The rectangular ramification particularly noted by Gräbner is apparently caused by the tendency of the lateral branchlets to grow upward while the main branch is pendent; the same mode of growth occurs occasionally in Indian specimens of the type.

China: Szech'uan, Nan-chuan, August, 1891, *A. von Rosthorn* (No. 569 in Herb. Christiania).

Of *Viburnum Jacquemontii*, Planchon, and *Viburnum pallidum*, Franchet, I have not seen specimens, but in the descriptions of these plants I can find no characters by which to separate them from *Viburnum fœtidum*; *Viburnum ceanothoides*, judging by the specimens I have seen, appears also inseparable from *Viburnum fœtidum*.

46. VIBURNUM JAPONICUM, Sprengel, *Syst.* i. 934 (1825). — Roemer & Schultes, *Syst.* iii. 320. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 488; *Mél. Biol.* x. 664. — Dippel, *Handb. Laubholzk.* i. 192, f. 121.

Cornus japonica, Thunberg, *Fl. Jap.* 63 (1784).

Viburnum macrophyllum, Van Hall, *Fl. des Jard.* ii. 97, t. (not Thunberg) (1859).

Viburnum Buergeri, Miquel, *Ann. Mus. Lugd.-Bat.* ii. 268 (1866); *Prol. Fl. Jap.* 156. — Franchet & Savatier, *Enum. Pl. Jap.* i. 201. — Koch, *Dendr.* ii. pt. i. 56.

Japan: Kiu-siu, without locality and name of collector (Herb. Lugd.-Bat. 1853–56), *C. Wright*, Nagasaki, 1862, *R. Oldham*, 1863, *Maximowicz*; sometimes cultivated and about as hardy as *Evonymus japonicus*, Thunberg.

VIBURNUM JAPONICUM, var. BONINSIMENSE, Makino, *Bot. Mag. Tokio*, xvi. 157 (1902).

Japan: Bonin Island (ex Makino).

This form differs from the type in its suborbicular leaves truncate at the base, denser corymbs, and shorter stamens.

Viburnum japonicum, var. *latifolium*, and var. *variegatum*, Hort. ex Zabel (Beissner, Schelle & Zabel, *Handb. Laubholz.* 440 [1903]), are garden forms sometimes met with in cultivation.

47. VIBURNUM THEIFERUM, Rehder. See p. 45, t. 121.

48. VIBURNUM PHLEBOTRICHUM, Siebold & Zuccarini. See p. 43, t. 120.

49. VIBURNUM WRIGHTII, Miquel. See vol. i. p. 37, t. 19.

50. VIBURNUM DILATATUM, Thunberg, *Fl. Jap.* 124 (1784). — De Candolle, *Prodr.* iv. 329. — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. iii. 381. — Lindley, *Jour. Hort. Soc. Lond.* iii. 247. — A. Gray, *Mem. Am. Acad.* n. ser. iv. 393. — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266; *Prol. Fl. Jap.* 154. — Moore, *Jour. Bot.* xiii. 231. — Franchet & Savatier, *Enum. Pl. Jap.* i. 200; ii. 381. — Koch, *Dendr.* ii. pt. i. 56. — *Bot. Mag.* t. 6215. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 488; *Mél. Biol.* x. 644. — Hemsley, *Jour. Linn. Soc.* xxiii. 351. — Dippel, *Handb. Laubholzk.* i. 188, f. 118. — Koehne, *Deutsche Dendr.* 536. — Sargent, *Garden and Forest*, iv. 148, f. 28. — Gräbner, *Engler Bot. Jahrb.* xxix. 588; xxxvi. Beibl. No. lxxxii. 99.

Japan: Hokkaido, Hakodate, 1853–56, *C. Wright*, 1859, *C. Wilford*, Prov. Oshima, Moheiji, 1890, *K. Watanabe*, Mororan, 1905, *J. G. Jack*; Hondo, Yokohama, 1862, *R. Oldham* (No. 481) and *Maximowicz*, Simoda, 1855, *C. Wright*, Tokio, 1882, *K. Miyabe*, Sendai, Agamatsu, Fukushima, Odawara, Miyanoshita, Lake Chuzenji and Nikkō, 1892, *C. S. Sargent*; Kiu-siu, Nagasaki, *R. Oldham* and *Maximowicz*. Korea: Quelpart Island, 1906, and "Syou Ouen" and "Pomasa," 1905, *U. Faurie* (Nos. 682, 312, and 673 in Herb. Arnold Arboretum). China: Shensi (ex Maximowicz and Gräbner); Hupeh, *A. Henry* (No. 544), *E. H. Wilson* (No. 944).

The only Chinese specimens I have seen are those collected by Wilson and Henry, and these differ somewhat from the typical Japanese plant chiefly in their denser and smaller corymbs and smaller leaves; but this Chinese material is so meagre that I cannot decide whether or not the Chinese plant should be separated from the typical *Viburnum dilatatum*.

51. VIBURNUM CORYLIFOLIUM, Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 174 (1858). — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 3.

China: Yunnan, Mengtze, *A. Henry* (No. 11362); also on the Himalayas.

52. VIBURNUM MULLAHA, Hamilton ex Don, *Prodr. Fl. Nepal.* 141 (1825). — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 487; *Mél. Biol.* x. 663.

Viburnum stellulatum, Wallich, *Pl. As. Rar.* ii. 54, t. 169 (1830). — De Candolle, *Prodr.* iv. 327. — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 174. — Brandis, *For. Fl. Brit. Ind.* 258; *Indian Trees*, 361. — Clarke, *Hooker f. Fl. Brit. Ind.* iii. 4. — Franchet, *Nouv. Arch. Mus.* sér. 2, viii. 251; *Pl. David.* ii. 69. — Collett, *Fl. Simlen.* 222.

Viburnum involucratum, Wallich ex De Candolle, *Prodr.* 327 (1830). — Hooker f. & Thomson, *Jour. Linn. Soc.* ii. 175.

China: Szech'uan, Mupin, *David* (ex Franchet); also on the Himalayas from Kashmir to Sikkim.

53. VIBURNUM FORDIÆ, Hance, *Jour. Bot.* xxi. 321 (1883). — Hemsley, *Jour. Linn. Soc.* xxiii. 352.

China: Kwangtung, Fingushan, 1882, *C. Ford*, 1883 (in Herb. Gray); without locality, *C. Wenyon* (in Herb. Kew).

Viburnum Fordiæ is closely related to *Viburnum Mullaha*, Hamilton, from which it differs chiefly in its smaller acute and generally ovate leaves narrowed toward the rounded base and in its more densely pubescent flowers.

54. VIBURNUM HIRTULUM, *n. sp.*

Leaves coriaceous, ovate, acute or acutish, rounded at the base, remotely and obscurely denticulate, loosely covered with fascicled and furcate hairs or glabrescent at maturity on the upper surface, more densely covered with fasciculate hairs on the lower surface, particularly on the veins, from 4 to 7 centimetres long, with five or six pairs of veins ending in the teeth, slightly impressed above and prominent beneath; petioles densely covered with fasciculate yellow hairs, from 0.5 to 1 centimetre in length. Corymbs terminal, umbelliform, from 6 to 7 centimetres in diameter, on peduncles from 1 to 2 centimetres long, and like the whole corymb densely covered with spreading fasciculate hairs; rays five or six; flowers on rays of the third and fourth order, with linear hairy bractlets at the base; ovary small, like the ovate calyx-teeth covered with long fasciculate hairs; corolla rotate, from 4 to 5 millimetres in diameter, hairy outside, the lobes orbicular; stamens as long or only slightly shorter than the lobes; anthers suborbicular, yellow; style short and thick, hardly exceeding the calyx-teeth. Fruit unknown.

A shrub, with the young branchlets densely ferrugineously fasciculate-pilose, later becoming glabrous and grayish brown.

China: Kwangtung, North River, November, 1888 (ex Herb. Hongkong Bot. Gard. No. 116 in Herb. Kew).

Viburnum hirtulum is allied to *Viburnum Mullaha*, but is easily distinguished from that species by the coriaceous ovate acutish indistinctly toothed leaves, fasciculate-pilose on both surfaces, and with only five or six pairs of veins.

55. VIBURNUM WILSONII, *n. sp.*

Leaves membranaceous, ovate, long-acuminate, rounded or broadly cuneate at the base, serrate from near the base, yellowish green and loosely covered with furcate or simple hairs on the upper surface, lighter green and glabrous on the lower surface, with the exception of the long appressed hairs on the midribs and on the six or seven pairs of veins ending in the teeth, from 4 to 8 centimetres long and from 2.5 to 3 centimetres broad; petioles without stipules, from 1 to 1.5 centimetres in length, covered with short fasciculate hairs and with long simple hairs. Corymbs terminal, about 5 centimetres in diameter, on peduncles about 2 centimetres long, and, like the whole corymb and the outside of the corolla, covered with a yellowish velvety pubescence of fasciculate hairs; rays about six; flowers on rays of the second and third order; ovary 1 millimetre long, with ovate calyx-teeth, pubescent; corolla rotate, 5 millimetres in diameter, the lobes orbicular-ovate, pubescent outside; stamens shorter than the corolla-lobes; anthers yellow, broadly oval; style short and thick. Fruit unknown.

A shrub, with branchlets covered with fasciculate hairs and becoming dark purplish brown. Winter-buds with two pairs of scales, fasciculate-pilose.

China: Szech'uan, Mount Omei, *E. H. Wilson* (No. 5025 in Herb. Arnold Arboretum).

Viburnum Wilsonii seems most closely allied to *Viburnum Fordiæ*, Hance, and *Viburnum Mullaha*, Hamilton, but is easily distinguished from either of these species by the velutinous corymb and corolla; from *Viburnum dasyanthum*, Rehder, which has the corymb coated with a similar pubescence, it differs more widely in the broader pubescent serrate leaves, the pubescent petioles without stipules, and in the much shorter stamens.

56. VIBURNUM LUZONICUM, Rolfe. See p. 97, t. 146.

57. VIBURNUM OVATIFOLIUM, *n. sp.*

Leaves membranaceous, ovate to oblong-ovate, long-acuminate, rounded at the base, serrate, with seven or eight straight veins slightly impressed above and ending in the mucronate teeth, dark yellowish green on the upper surface, paler and glabrous with the exception of the simple loosely appressed hairs on the midribs and veins on the lower surface, from 5 to 7 centimetres long and from 2.5 to 4 centimetres broad; petioles nearly glabrous, from 1 to 1.5 centimetres in length, with subulate sparingly hairy and glandular stipules. Corymbs terminal, from 4 to 6 centimetres in diameter, loosely covered with small stellate hairs interspersed with longer simple hairs, on peduncles less than 1 centimetre in length; rays from five to seven; flowers on rays of the third order; ovary loosely stellate-tomentose, about 1 millimetre long; calyx-lobes broadly triangular, stellate-pubescent and ciliate; corolla rotate, 5 millimetres in diameter, sparingly covered on the outside with short fasciculate hairs, the lobes semi-orbicular; stamens shorter than the corolla; anthers broadly oval, yellow; style short, slightly exceeding the calyx-lobes. Fruit unknown.

A dichotomously branched shrub, with glabrous light brown branchlets, becoming dark red-brown and lustrous in their second year. Winter-buds with two pairs of scales.

China: Yunnan, Mengtze, "north mountains, forests, altitude 3300 metres," *A. Henry* (No. 10211 A and B in Herb. Arnold Arboretum).

Viburnum ovatifolium is most nearly related to *Viburnum erosum*, Thunberg, and *Viburnum betulifolium*, Batalin. From the former it is easily distinguished by its longer petioles, the longer acuminate leaves, broad and rounded at the base and nearly glabrous, by the pubescent corolla and shorter stamens; from the latter it may be distinguished by the shorter petioles, the ovate leaves rounded at the base, the shorter stamens, and the smaller less compound corymbs. It is also related to *Viburnum luzonicum*, var. *formosanum*, Rehder, from which it differs in its stipulate petioles and in the long-acuminate leaves with more numerous veins.

58. VIBURNUM BETULIFOLIUM, Batalin. See p. 99, t. 147.

59. VIBURNUM LOBOPHYLLUM, Gräbner. See p. 101, t. 148.

60. VIBURNUM DASYANTHUM, Rehder. See p. 103, t. 149.

61. VIBURNUM HUPEHENSE, *n. sp.*

Leaves membranaceous, broadly ovate, acuminate, truncate or subcordate at the base, coarsely dentate, with short acuminate mucronate teeth, loosely covered with fasciculate hairs more abundant on the lower side, dark yellowish green on the upper surface, lighter green on the lower surface, with seven or eight pairs of straight veins, from 5 to 7 centimetres long and from 3 to 6 centimetres broad; petioles grooved, from 1.5 to 2 centimetres in length, densely covered with fasciculate hairs, and furnished with persistent linear-lanceolate pubescent stipules. Corymbs terminal, from 4 to 5 centimetres in diameter, on peduncles about 2 centimetres in length and like the rays densely villous, with short fasciculate hairs; rays usually five; flowers unknown. Drupes on rays of the second and third order, ovoid, red; stone much compressed, orbicular-ovate, 7 millimetres long and 6 millimetres broad, with three ventral and two dorsal rather shallow grooves; seed reddish brown, minutely punctulate.

A shrub, with branchlets furnished with fasciculate hairs, becoming glabrous and dark purplish brown in their second year. Winter-buds with two pairs of scales.

China: Hupeh, *A. Henry* (No. 6805 in Herb. Gray).

Viburnum hupehense is most nearly related to *Viburnum dilatatum*, Thunberg, and *Viburnum betulifolium*, Batalin. From the first it differs chiefly in its orbicular-ovate leaves and stipulate petioles, and from the second in the leaves being pubescent on both surfaces.

62. VIBURNUM ICHANGENSE, Rehder. See p. 105, t. 150.

63. VIBURNUM EROSUM, Thunberg, *Fl. Jap.* 124 (1784). — De Candolle, *Prodr.* iv. 327. — Siebold & Zuccarini, *Abhand. Akad. Münch.* iv. pt. iii. 171. — Miquel, *Ann. Mus. Lugd.-Bat.* ii. 266; *Prol. Fl. Jap.* 154. — Franchet & Savatier, *Enum. Pl. Jap.* i. 200; ii. 308. — Maximowicz, *Bull. Acad. Sci. St. Pétersbourg*, xxvi. 491; *Mél. Biol.* x. 669. — Franchet, *Nouv. Arch. Mus. Paris*, sér. 2, vi. 28; *Pl. David.* i. 148. — Hemsley, *Jour. Linn. Soc.* xxiii. 351 (in part). — Sargent, *Garden and Forest*, ix. 85, f. 9. — Palibin, *Act. Hort. Petrop.* xvii. 103. — Rehder, *Bailey Cycl. Am. Hort.* iv. 1926.

Japan: Hondo, Fudji-san, 1862, *Maximowicz*, Nagasendo near Fukushima and Fusan, 1902, *C. S. Sargent*, above Narai, Shinano, 1905, *J. G. Jack;* Shikoku, Nanokawa, Tosa, 1887, *K. Watanabe;* Kiu-siu, Nagasaki, 1863, *Maximowicz.* Korea: Quelpart Island, *U. Faurie* (Nos. 676, 679, 680 in Herb. Arnold Arboretum), Puk-han, Seoul, 1905, *J. G. Jack*, Tsusima Island, 1859, *C. Wilford;* rarely cultivated, introduced into the Arnold Arboretum by Professor Sargent.

Franchet distinguishes three varieties: var. *punctatum*, var. *furcipilum*, and var. *læve;* the first has the leaves with fasciculate hairs raised on minute tubercles, the second has sparse furcate or simple hairs without tubercles and the third is almost glabrous with the exception of the long simple hairs on the branches. A rather distinct form is represented by Faurie's No. 676, which has longer petioles, and larger leaves somewhat resembling in shape those of *Viburnum dilatatum*, Thunberg.

VIII. OPULUS, De Candolle.

Leaves deciduous, lobed, palminerved, stipulate; drupes red; stone compressed, slightly grooved; albumen solid; glabrescent shrubs; easily distinguished from the other sections by the lobed leaves.

Petioles glandular; leaves three-lobed, rarely entire; corymbs with radiant flowers. 64. V. SARGENTI.
Petioles without glands; leaves three to five-lobed, with coarsely toothed lobes from 3 to 5 centimetres long; corymbs without radiant flowers. 65. V. KANSUENSE.

64. VIBURNUM SARGENTI, Koehne. See vol. i. p. 83, t. 42.

VIBURNUM SARGENTI, var. CALVESCENS, Rehder, *Mitt. Deutsch. Dendr. Ges.* xii. 125 (1903).

This differs from the type in its glabrous leaves and branches.

There seems to exist a form of this species with all the flowers sterile, as Korshinski mentions a *Viburnum Opulus sterile* from the mount Yi-san near Seoul. I have observed in the Arnold Arboretum a plant of this species which showed the tendency to produce a few small corymbs with most of the flowers sterile.

65. VIBURNUM KANSUENSE, Batalin, *Act. Hort. Petrop.* xiii. 372 (1894).

China: Kansu, *G. N. Potanin* (ex Batalin); western China, *E. H. Wilson* (No. 3732).

Arnold Arboretum. ALFRED REHDER.

EXPLANATION OF THE PLATE.

PLATE CL. VIBURNUM ICHANGENSE.

1. A flowering branch, natural size.
2. A flower with the corolla displayed, enlarged.
3. A fruiting branch, natural size.
4. A stone, ventral view, enlarged.
5. A stone, dorsal view, enlarged.
6. Cross section of a stone, enlarged.

Figures 1 and 2 of this plant were made from Henry's specimen No. 5276, and figures 3 to 6 from Wilson's specimen No. 569.

C. E. Faxon del.

VIBURNUM ICHANGENSE, Rehd.

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

Professor Sargent is recognized as the highest authority on the subject he treats. His position as Director of the Arnold Arboretum of Harvard University, the richest dendrological collection in America, which has been formed by him, and his opportunities while in the employ of the government of the United States for exploring the forests and studying the trees in every part of the country, opportunities supplemented by his connection with the Northern Transcontinental Survey, and by the duty intrusted to him of forming for the New York Museum of Natural History a collection to illustrate the forest products of North America, specially qualify him for this work, in the preparation of which he has been actively engaged during the last twenty-five years.

No cost or pains have been spared in the mechanical execution of the illustrations of this work, which has taken the first rank among those great scientific works of which Americans are justly proud. It must always remain a standard authority on the subject which it treats.

The price of the *Silva* is $25 net a volume, or $350 for the set, and only subscriptions for the entire work will be accepted.

Specimen pages and a sample plate will be submitted upon request. Address,

HOUGHTON, MIFFLIN & COMPANY,
4 Park St., Boston.

MANUAL OF THE TREES OF NORTH AMERICA

(EXCLUSIVE OF MEXICO)

THIS volume contains brief descriptions in plain and simple language of some 630 trees, accompanied by a figure of the leaves, fruits, and flowers of each tree, with keys leading to a ready determination of the genera and species. The illustrations are a feature of the book. They are reproductions of drawings made by Mr. Charles E. Faxon, the artist who made the illustrations for "The Silva of North America," and exhibit in a remarkable degree his skill, knowledge, and taste, — the salient or more characteristic features of each species being shown in an admirable manner.

Professor Sargent's descriptions bring out the botanical characters of each genus and species, its geographical distribution and economic value, and its relationship to other species of the same group growing in other parts of the world. The book represents in condensed form the life-work of the author and of the artist in studying, describing, and illustrating the trees of North America, which they have succeeded in making known as the trees of no other continent are known.

The Manual makes available in convenient form the most essential points of the treasures of information to be found in "The Silva of North America." It will be indispensable to every one interested in nature, but especially to all

BOTANISTS, TEACHERS, FORESTERS,
LANDSCAPE-GARDENERS, HORTICULTURISTS,
NURSERYMEN, PARK SUPERINTENDENTS,
AND THE OWNERS OF COUNTRY PLACES.

As a convenient handbook it will serve as a guide to the trees to persons traveling in different parts of this country. Professor Sargent is, without doubt, the greatest living authority on his subject, and his new work will fill a place similar to that long held by Gray's Manual of Botany.

"An admirable book in every way by a past master in his subject, a book that goes straight to the foundations and that every one that loves trees must have." — *New York Sun.*

"A close study of its pages reveals Professor Sargent's careful methods of work, his accuracy, his clear descriptive powers, his exactitude of statement and his marvellous, wide, and minute knowledge of every branch of the subject. . . . Its standard position as the one authoritative record of North American trees is unquestioned." — *Boston Evening Transcript.*

WITH 644 ILLUSTRATIONS BY C. E. FAXON

In green buckram, 8vo, $6.00, *net.* Postpaid.

Specimen pages and a sample plate will be submitted upon request. Address

HOUGHTON, MIFFLIN & COMPANY
4 Park Street, Boston

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

VOL. II, PART III

Issued June 1911

BOSTON AND NEW YORK
HOUGHTON MIFFLIN COMPANY
The Riverside Press, Cambridge
1911

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest*. The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America*, but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts. The parts will be sold separately, at $5.00 *net*, carriage paid. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

HOUGHTON MIFFLIN COMPANY

4 PARK STREET, BOSTON

ACOELORRAPHE, H. WENDL.

(Palmæ.)

ACOELORRAPHE, H. Wendland, *Bot. Zeit.* xxxvii. 148 (1879). — Beccari, *Webbia*, ii. 107.
SERENOA, Sargent, *Silva N. Am.* xiv. 75 (in part, not Hooker f.) (1902).
PAUROTIS, O. F. Cook, *Mem. Torr. Bot. Club*, xii. 21 (in part) (1902). — Britton & Shafer, *N. Am. Trees*, 141 (1908).

Trees, with tall slender often clustered stems clothed for many years with the sheathing bases of the petioles of fallen leaves. Leaves suborbicular, divided into numerous two-parted segments plicately folded at the base; rachis short, acute; ligule thin, concave, furnished with a broad membranaceous dark red-brown deciduous border; petioles slender, flat or slightly concave on the upper side, rounded and ridged on the lower side, with a broad high rounded ridge, thickened and cartilaginous on the margins, more or less furnished with stout or slender flattened teeth; vagina thin and firm, bright mahogany red, lustrous, closely enfolding the stem, their fibres thin and tough. Spadix paniculate, interpetiolar, its rachis slender, compressed, ultimate branches numerous, slender, elongated, gracefully drooping, hoary-tomentose, the primary branches flattened, the secondary terete in the axils of ovate acute chestnut-brown bracts; spathes flattened, thick and firm, deeply two-cleft and furnished at the apex with a red-brown membranaceous border, enclosing the rachis of the panicle, each primary branch with its spathe and the node of the rachis below it enclosed in a separate spathe, the whole surrounded by the larger spathe of the node next below. Flowers perfect, minute, sessile on the ultimate branches of the spadix, in the axils of ovate acute chestnut-brown caducous bracts, solitary toward the end of the branches and in two- or three-flowered clusters near their base; calyx truncate at the base, divided into three broadly ovate sepals dentate on the margins, valvate in æstivation, enlarged and persistent under the fruit; corolla three-parted nearly to the base, its divisions valvate in æstivation, oblong-ovate, thick, concave and thickened at the apex, deciduous; stamens six, included; filaments nearly triangular, united below into a cup adnate to the short tube of the corolla; anthers short-oblong, attached on the back below the middle, introrse, two-celled, the cells opening longitudinally; ovary obovate, of three carpels, each with two deep depressions on their outer faces, united into a slender style; stigma minute, terminal, persistent on the fruit; ovule solitary, erect from the bottom of the cell, anatropous. Fruit drupaceous, subglobose, one-seeded, black and lustrous; exocarp thin and fleshy; endocarp thin, crustaceous; seed erect, free, subglobose, light chestnut-brown; testa thin and hard; hilum small, suborbicular; raphe ventral, oblong, elongated, black, slightly prominent, without ramifications; albumen homogeneous; embryo lateral.

Two species of Acoelorraphe have been distinguished; they inhabit southern Florida, and one species occurs also in Cuba and on the Bahama Islands.

The generic name, from ἀ priv., κοῖλος and ῥαφή, refers to the character of the seed.

The Florida species was first referred by me to Serenoa (see *Bot. Gazette*, xxvii. 90). Acoelorraphe is, however, well distinguished from Serenoa by the calyx. The calyx of Serenoa is cupular and only slightly three-lobed, while in Acoelorraphe it is divided into three segments. The sculptured depressions found on the carpels of Acoelorraphe do not occur in Serenoa, and the fruit of Acoelorraphe does not have the fibrous orange-brown resinous mesocarp of that of Serenoa. The two genera may also be distinguished by the rachis of the leaf. In Acoelorraphe the lower side of the

petiole is prolonged into a pointed rachis, while in Serenoa it is furnished with a narrow ligule and is not produced into a rachis. From Brahia, which it closely resembles, Acoelorraphe differs only in the testa of the seed, which is not thickened and does not penetrate the albumen on the side of the raphe.

The two species of Acoelorraphe are very similar; but until more is known about them it seems best to follow Beccari, who has carefully studied the Coryphæ and to whom I am indebted for much information in regard to Acoelorraphe and its allied genera, and keep the two species distinct. Their distinctive characters are, —

Petioles furnished with stout marginal teeth throughout their entire length; leaves green on both surfaces, the primary divisions extending to the middle, their secondary divisions only from 8 to 15 centimetres long; flowers from 2 to 2.5 millimetres long; fruit from 8 to 9 millimetres in diameter; stems forming large thickets.

1. A. Wrightii.

Petioles furnished with thinner teeth, usually unarmed toward the apex; leaves green or glaucescent on the lower surface, their primary divisions extending nearly to the base, the secondary divisions often 25 centimetres long; flowers not more than 2 millimetres long; fruit from 6 to 7 millimetres in diameter. 2. A. Arborescens.

The synonomy of the second species becomes, —

Acoelorraphe arborescens (Sargent), Beccari, *Webbia*, ii. 113 (1907).

Serenoa arborescens (Sargent), *Bot. Gazette*, xxvii. 90 (1899); *Silva N. Am.* xiv. 77, t. 734; *Man.* 111, f. 98. — Small, *Fl. Southeastern U. S.* 224.

Paurotis Wrightii, Britton & Shafer, *N. Am. Trees*, 141 (in part) (1908).

An additional station for *Acoelorraphe arborescens* is at the head of East River, White Water Bay, where it was collected by A. A. Eaton on March 22, 1905, and by J. B. Ellis in June and October, 1908 (in herb. Arnold Arboretum).

C. S. S.

ACOELORRAPHE WRIGHTII (GRISEB. & WENDL.), BECC.

ACOELORRAPHE WRIGHTII (Grisebach & Wendland), Beccari, *Webbia*, ii. 109 (1907).

COPERNICIA WRIGHTII, Grisebach & Wendland, *Grisebach Cat. Pl. Cub.* 220 (1866). — Sauvalle, *Fl. Cub.* 152. — Coombs, *Trans. St. Louis Acad. Sci.* vii. 471.

PAUROTIS ANDROSANA, O. F. Cook, *Mem. Torr. Bot. Club*, xii. 22 (*teste* Britton) (1902).

PAUROTIS WRIGHTII, Britton & Shafer, *N. Am. Trees*, 141 (in part), f. 107 (1908).

Leaves thin, light green on the two surfaces, from 50 to 60 centimetres in diameter, divided to the middle, the divisions of the primary lobes from 8 to 15 centimetres deep; petioles thin, gradually tapering from the base, about 2 centimetres wide at the end of the vagina and 5 or 6 millimetres wide at the apex, from 60 to 70 centimetres in length, and armed throughout their whole length with pale yellow teeth, nearly straight or incurved and pointing toward the apex or toward the base of the petiole, and about 5 millimetres long; rachis nearly triangular, 6 or 7 millimetres long and furnished with a thin narrow free reddish border; spadix from 8 to 12 decimetres long, the slender ultimate divisions often 3 or 4 decimetres in length. Flowers from 2 to 2.5 millimetres long, with a light chestnut-brown calyx and pale yellow-green corolla. Fruit from 9 to 10 millimetres in diameter.

A tree, with numerous stems, in Florida sometimes 10 metres high, forming great thickets and for many years covered with the prominent sheathing bases of fallen petioles.

Florida, Dade County;[1] Cuba, *C. Wright*, 1860–64 (No. 3217 type), *R. Coombs*, August 10, 1895 (No. 465), *Baker and Avares*, December 2, 1904 (No. 4208) (all in herb. Gray); and on the Bahamas (*teste* Britton).

[1] *Acoelorraphe Wrightii* appears to have been first noticed in Florida by the brothers John and Murion Soar of Little River during a cruise made by them round the southern end of the Florida Peninsula in about 1907. It was found by them in various locations from the rear of Madeira Hammock to Cape Sable, growing always at some distance from the coast in swamps of brackish or fresh water in muddy situations. Here it forms great thickets sometimes 10 metres high and often 16 or 17 metres through, the entire cluster of stems apparently from one original single stem.

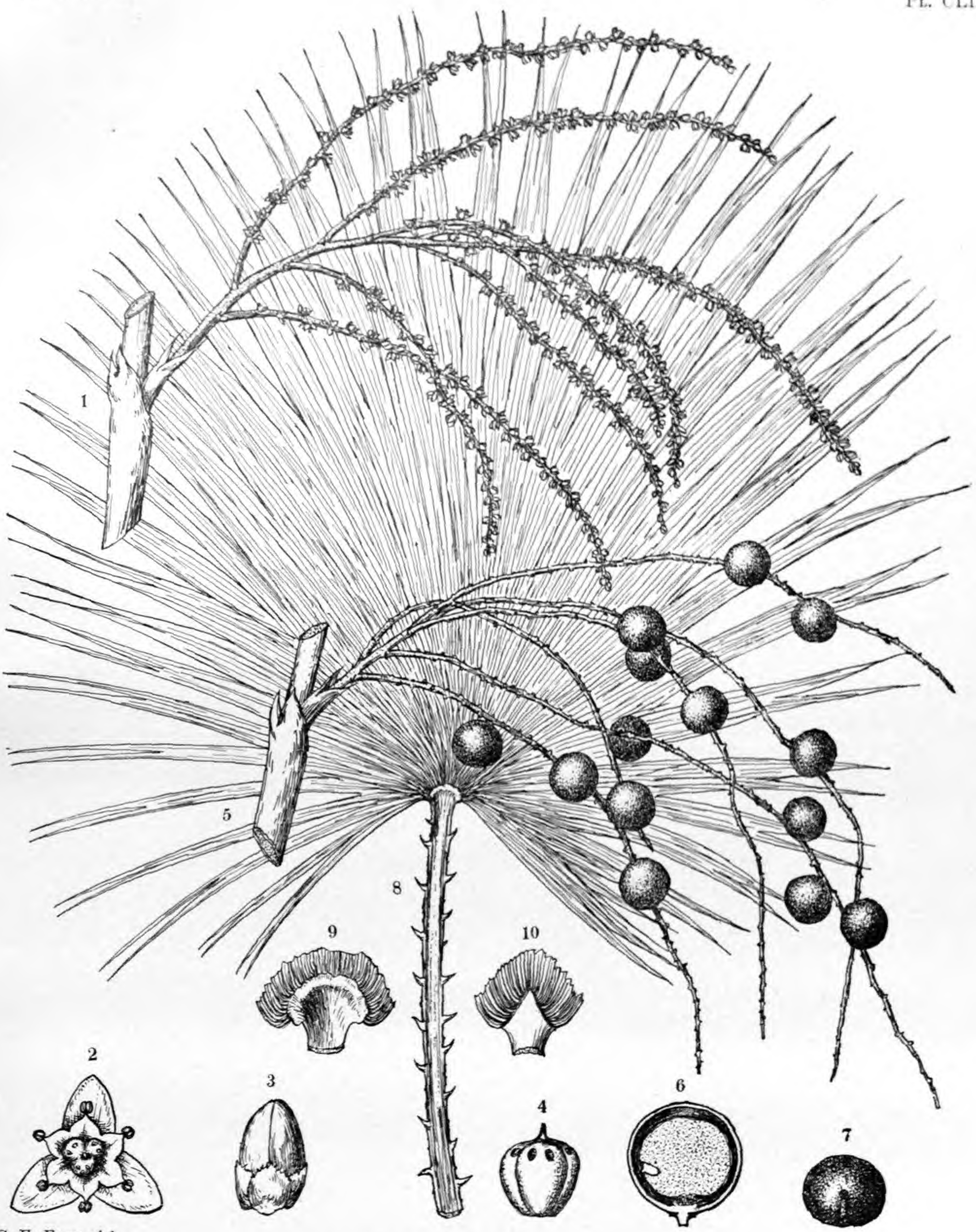
A small shoot was brought by them and planted at Little River. This is now 6 or 7 metres high, with a dozen stems 7.5 to 10 centimetres in diameter. Leaves and flowers from this plant were sent to me in May, 1910, by Mr. Charles T. Simpson of Little River, to whom I am thus indebted for information of a second species of Acoelorraphe in Florida.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLI. ACOELORRAPHE WRIGHTII.

1. Portion of a spadix with flowers, natural size.
2. A flower, enlarged.
3. A flower-bud, enlarged.
4. A pistil, enlarged.
5. Portion of a spadix with fruit, natural size.
6. Vertical section of a fruit, enlarged. (From specimen collected in Cuba by C. Wright.)
7. A seed, enlarged. (From specimen collected in Cuba by C. Wright.)
8. A leaf, much reduced.
9. A ligule, natural size.
10. A rachis, natural size.



C. E. Faxon del.

ACOELORRAPHE WRIGHTII, Becc.

QUERCUS ARKANSANA, SARG.

QUERCUS ARKANSANA, *n. sp.*

Leaves broadly obovate, slightly three-lobed or dentate at the wide apex and cuneate at the base, or on sterile branches oval to ovate, acute or rounded at the apex, full and rounded at the base and laterally undulate lobed, the lobes terminating in long slender mucros; when they unfold slightly tinged with red, thinly covered with pale stellate hairs persistent until summer, the midribs and veins more thickly clothed with clusters of long straight hairs, and at maturity thin but firm in texture, glabrous with the exception of small clusters of axillary pubescence, light yellow-green on the upper surface, paler on the lower surface, from 5 to 8 centimetres long and from 5 to 7 centimetres wide, or on sterile branches often from 12 to 14 centimetres long and from 6 to 7 centimetres wide, with slender light yellow midribs, thin primary veins, and prominent veinlets; petioles slender, coated at first with matted clusters of pale hairs, becoming glabrous, or sometimes slightly pubescent during the season, from 1.5 to 2 centimetres in length; stipules linear, scabrous, about 5 millimetres long, deciduous. Staminate flowers in aments covered with clusters of long pale hairs, from 5 to 6 centimetres in length; calyx thin and scarious, usually four- or rarely three-lobed, the lobes rounded or acute, thinly covered with long white hairs; stamens usually four; anthers ovate-oblong, apiculate, dark red; pistillate flowers on stout peduncles, hoary-tomentose like the involucral scales; stigmas dark red. Fruit ripening in its second season, solitary or in pairs, on stout glabrous peduncles 4 or 5 millimetres long; acorns broadly ovate, rounded at the apex, slightly stellate-pubescent especially below the middle, light brown, obscurely striate, from 6 to 8 millimetres long and from 14 to 15 millimetres in diameter, their shell lined with pale nearly white tomentum, the base only enclosed in the flat cup pale pubescent on the inner surface and covered by the closely appressed scales obtuse at their narrow apex, red on the margins and thinly covered with pale pubescence, those of the upper rank small, erect, inserted on the top of the cup and forming a rim around its inner surface; seed light chestnut-brown.

A tree, when crowded in the forest often from 20 to 25 metres high, with a tall trunk and stout ascending branches forming a long narrow head, or when growing in the open and uncrowded by other trees rarely more than 12 metres high with a short trunk sometimes 3 decimetres in diameter, covered with thick nearly black bark divided by deep fissures into long narrow ridges broken on the surface into thick closely appressed scales, small spreading smooth gray branches forming a low round-topped head, and slender branchlets thickly coated early in the season with pale stellate hairs, becoming light gray-brown or reddish brown and still pubescent or nearly glabrous in their first autumn and darker-colored and glabrous the following year, and gracefully drooping leaves. The winter-buds are ovate, acute, and covered with thin light chestnut-brown slightly pubescent or nearly glabrous scales. Flowers late in March or early in April. Fruit ripens in October.

Low woods, Fulton, Hempstead County, Arkansas, *B. F. Bush*, April 17, 1905 (No. 2365); low rolling sandhills about four miles north of Fulton, here common over a considerable area but apparently very local, *B. F. Bush*, May 21, 1909 (No. 5096), June 10, 1909 (No. 5820), *B. F. Bush* and *C. S. Sargent*, October 4, 1909 (No. 2939 type), *C. S. Sargent*, April 3, 1910. (All in herb. Arnold Arboretum.)

In the shape of the leaves of the fertile branches this Oak most resembles *Quercus marilandica* Muenchhausen. The leaves, however, are gradually or abruptly narrowed and cuneate, not narrow and rounded or cordate at the base like

those of *Quercus marilandica*, and the oval or ovate acute leaves with undulate margins which appear to be common on vigorous shoots of *Quercus arkansana* do not occur, so far as I have been able to observe, on the shoots of *Quercus marilandica*, which on vigorous shoots sometimes produces oblong to obovate deeply lobed leaves. The leaves of *Quercus arkansana* are without the short rufous hairs which are mixed with the stellate hairs on the young leaves and branches of *Quercus marilandica* which, usually persistent during the season, give to the lower surface of the leaves of this tree their peculiar orange-colored or brownish appearance. The acorn of the Fulton tree is ovate, much broader than long, not oblong like that of *Quercus marilandica*, and the cup is more or less shallow with thinner more closely appressed pubescent scales, the rim round the inner surface of the cup being formed by only a single row of scales with no tendency to become reflexed or to form the thick rim which is one of the striking characters in the fruit of *Quercus marilandica*. The fruit more closely resembles that of the Water Oak, *Quercus nigra* Linnæus, but the leaves are different in shape and the Water Oak is without stellate hairs.

A specimen with immature fruit collected by Mohr on July 4, 1880, on the wooded banks of the Conecuh River, Conecuh County, Alabama, and considered by him a possible hybrid between *Quercus nigra* and *Quercus marilandica*, judging by the shape of the leaves and the occasional stellate hairs on their lower surface, is perhaps *Quercus arkansana*. This Oak is one of the most interesting of the numerous plants discovered by Mr. Bush in Missouri and Arkansas.

C. S. S.

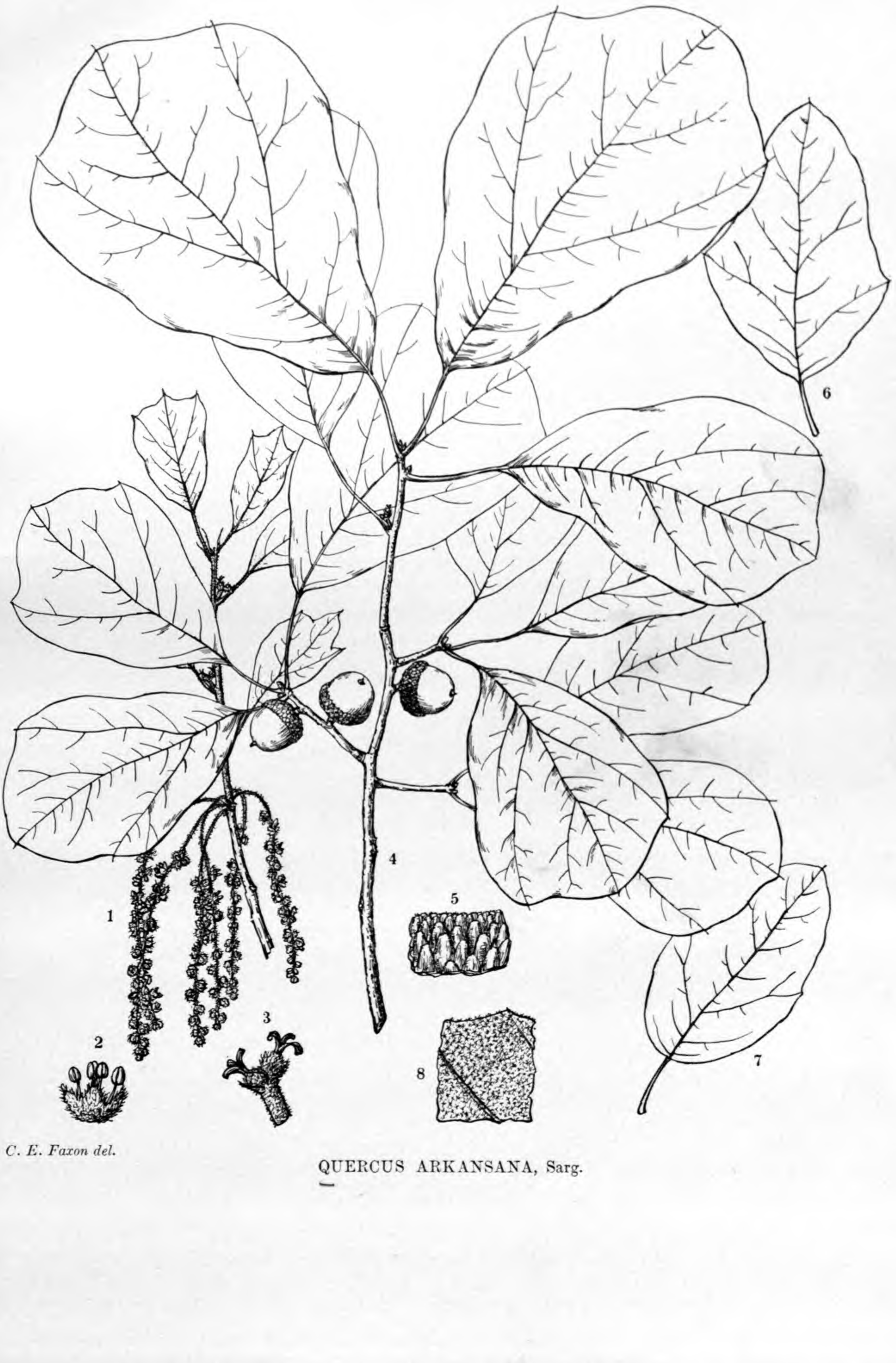
EXPLANATION OF THE PLATE.

PLATE CLII. QUERCUS ARKANSANA.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower, enlarged.
4. A fruiting branch, natural size.
5. Part of a cup of the fruit, enlarged.

6 and 7. Leaves from a sterile branch, natural size.

8. Portion of a young leaf showing the staminate pubescence.



C. E. Faxon del.

QUERCUS ARKANSANA, Sarg.

TREMA, Lour.

(Ulmaceæ.)

Trema, Loureiro, *Fl. Cochin.* 562 (1790). — Bentham & Hooker, *Gen.* iii. 355. — Engler & Prantl, *Pflanzenfam.* iii. pt. i. 65.

Sponia, Commerson ex Lamarck, *Dict.* iv. 139 (1796). — Endlicher, *Gen.* 276. — Meissner, *Gen.* pt. ii. 259. — Decaisne, *Nouv. Ann. Mus.* iii. 499 (*Herb. Timor. Descript.*). — Planchon, *Ann. Sci. Nat.* sér. 3, x. 264.

Unarmed trees and shrubs, with watery juices and terete branchlets. Leaves alternate, often two-ranked, serrate, penniveined, three-nerved from the base, short-petiolate, persistent; stipules lateral, free, usually small, caducous. Flowers apetalous, small, monœcious, dicœcious, or rarely perfect, in axillary cymes; calyx five- or rarely four-parted, the lobes induplicate, valvate or slightly imbricated in the bud, or in perfect flowers more or less concave and induplicate; stamens five or rarely four, opposite the calyx-lobes and inserted on their base, occasionally present in the pistillate flower; filaments short, erect; anthers oblong, attached on the back near the base, introrse, two-celled, the cells opening longitudinally; ovary sessile, rudimentary or wanting in the staminate flower; style central, slightly or entirely divided into two linear fleshy stigmatic branches; ovule solitary, pendulous from the apex of the cell, anatropous, micropyle superior. Fruit drupaceous, short-oblong to subglobose, crowned by the persistent style; exocarp more or less fleshy; endocarp hard; seed filling the cavity of the nutlet; testa membranaceous, albumen fleshy, often scanty; embryo curved or slightly involute; cotyledons narrow; radicle incurved, ascending.

Trema, with about twenty species, is widely distributed in tropical and subtropical regions of the two hemispheres. Two species reach the coast region and the keys of southern Florida. Of these *Trema mollis* is a small tree, and *Trema Lamarckiana*,[1] which in Florida has been noticed only on Key Largo,[2] where it grows as a small shrub, is widely distributed over the Bahamas and many of the West Indian islands.[3]

C. S. S.

[1] Blume, *Mus. Lugd. Bat.* ii. 58 (1852).
Celtis Lima, Lamarck, *Dict.* iv. 140 (not Swartz) (1796).
Celtis Lamarckiana, Rœmer & Schultes, *Syst.* vi. 311 (1820).
Sponia Lamarckiana (Rœmer & Schultes), Decaisne, *Nouv. Ann. Mus.* iii. 499 (*Herb. Timor. Descript.*) (1835). — Planchon, *Ann. Sci. Nat.* sér. 3, x. 332; *De Candolle Prodr.* xvii. 204. — Grisebach, *Fl. Brit. W. Ind.* 150; *Cat. Pl. Cub.* 57. — Sauvalle, *Fl. Cub.* 149. — Duss, *Ann. Inst. Col. Marseille*, iii. 153 (*Fl. Phaner. Antill. Franç.*).
Celtis parvifolia, A. Richard, *Fl. Cub.* iii. 219 (1853).
Trema Lima (Lamarck), Hitchcock, *Rep. Mo. Bot. Gard.* iv. 129 (not Blume) (1893).

[2] *A. H. Curtiss*, 1881; *C. S. Sargent*, April 21, 1886 (in herb. Arnold Arboretum).

[3] There is a description and figure of this species in Plumier, *Pl. Amer. Fasc.* ed. Burmann, 201, t. 206, f. 2, as *Rhamnus inermis, foliis ovato-oblongis, scabris, serratis, floribus axillaribus, solitariis, fructu pedunculato.*

TREMA MOLLIS (WILLD.), BL.

TREMA MOLLIS (Willdenow), Blume, *Mus. Lugd. Bat.* ii. 58 (1852). — Coombs, *Trans. St. Louis Acad. Sci.* vii. 464.

CELTIS MOLLIS, Willdenow, *Spec.* iv. 996 (1805). — Humboldt, Bonpland & Kunth, *Nov. Gen. & Spec.* ii. 24.

SPONIA MOLLIS (Willdenow), Decaisne, *Nouv. Ann. Mus.* iii. 499 (*Herb. Timor. Descript.*) (1835). — Planchon, *Ann. Sci. Nat.* sér. 3, x. 331. — Grisebach, *Fl. Brit. W. Ind.* 150; *Cat. Pl. Cub.* 57. — Sauvalle, *Fl. Cub.* 149.

SPONIA MICRANTHA D, Planchon, *De Candolle Prodr.* xvii. 203 (in part) (1873).

TREMA MICRANTHA, Chapman, *Fl.* ed. 2, Suppl. 649 (not Blume) (1883).

TREMA FLORIDANA, Britton, *Small Fl. Southeastern U. S.* 366 (1903). — Britton & Shafer, *N. Am. Trees*, 360, f. 320.

Leaves two-ranked, ovate, abruptly acuminate, rounded, cordate, and more or less or not at all oblique at the base, finely serrate, with incurved or rounded apiculate teeth, dark green and scabrate on the upper surface, covered with pale tomentum on the lower surface, from 6 to 10 centimetres long, and from 3 to 6 centimetres wide, with prominent midribs and primary veins, and conspicuous reticulate veinlets; petioles stout, tomentose, about 1 centimetre in length; stipules narrow, acuminate, covered with long white hairs, about one third as long as the petioles. Flowers subtended by minute scarious deciduous bracts on short slender pedicels in bisexual many-flowered pedunculate villose cymes about as long as the petioles; calyx five-lobed, the lobes acute, oblong, incurved at the apex, villose on the outer surface; style divided to the base. Fruit short-oblong, slightly yellowish brown, from 4 to 5 millimetres in diameter.

A fast-growing short-lived tree, in Florida occasionally 8 or 9 metres high, with a tall trunk from 4 to 6 centimetres in diameter and covered with thin chocolate-brown bark roughened by numerous small wart-like excrescences and separating into small appressed papery scales, small crowded branches ascending at narrow angles, and stout hoary tomentose red-brown two-ranked branchlets. Flowers in March and April. Fruit ripens in the autumn or winter.

Florida: rich hammocks near the shores of Bay Biscayne and in the Everglades and on the southern keys; common, often springing up when the hammocks have been burnt or cleared of their deciduous-leaved forests, as *Populus tremuloides* Michaux and *Prunus pennsylvanica* Linnæus appear in the north on burned-over forest lands. Key West, *J. L. Blodgett;* Fort Dallas, *J. G. Cooper* ex herb. G. Thurber; Bay Biscayne, *E. Palmer*, 1874 (No. 516); Miami, *A. P. Garber*, July, 1877 (No. 229) (all in herb. Gray); between Bay Biscayne and the Everglades, *A. H. Curtiss*, May (No. 2543); old fields west of Bay Biscayne, *A. H. Curtiss*, 1882; Key Largo, *A. H. Curtiss*, November 7, 1885, *C. S. Sargent*, April 15, 1886; Miami, *Mrs. A. T. Slosson*, March, 1898; near Homestead, *A. R. Sargent*, March 21, 1908; Paradise Key in the Everglades,[1] *E. A. Bessey*, May 5, 1908 (No. 35); Everglades, *E. A. Bessey*, May, 1908 (No.

[1] The so-called keys of the Everglades lie near the southern end of the peninsula between Bay Biscayne and Ponce de Leon Bay. They are low island-like bodies of land raised above the general level surface of the Everglades, and are mostly covered with an open forest of pine trees. In the midst of this forest are hammocks of rich soil on which several of the tropical trees and shrubs of Florida grow to a larger size than in other parts of the state. These keys are difficult to reach and have not yet been systematically explored.

46); Long Key in the Everglades, *R. M. Harper*, March 26, 1909 (No. 101); Cocoanut Grove, *Miss O. Rodham*, 1910 (all in herb. Arnold Arboretum); also on many of the West Indian islands and in Mexico.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLIII. TREMA MOLLIS.

1. A flowering branch, natural size.
2 and 3. Staminate flowers, enlarged.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. Vertical section of a fruit, enlarged.
7. An embryo, enlarged.

C. E. Faxon del.

TREMA MOLLIS, Bl.

XIMENIA, L.

(Olacaceæ.)

XIMENIA, Linnæus, *Gen.* 361 (1737). — A. L. de Jussieu, *Gen.* 259. — Meissner, *Gen.* 45. — Endlicher, *Gen.* 1042. — Bentham & Hooker, *Gen.* i. 346. — Valeton, *Crit. Overz. Olacin.* 72. — Baillon, *Hist. Pl.* xi. 450 (in part). — Engler & Prantl, *Pflanzenfam.* iii. pt. i. 237.

HEYMASSOLI, Aublet, *Hist. Pl. Guian.* 324 (1775).

ROTTBOELIA, Scopoli, *Introd.* 233 (1777).

PIMECARIA, Rafinesque, *Alsograph. Am.* 64 (1838).

Trees and shrubs, with watery juices and terete armed or unarmed branchlets. Leaves alternate, entire, subcoriaceous, often fascicled, persistent, short-petiolate, without stipules. Flowers perfect, white, on slender pedicels in short axillary cymes or rarely solitary; calyx small, four-lobed, the lobes imbricated in the bud, persistent; disk wanting; petals four or five, hypogynous, narrow, bearded on their inner face, revolute above the middle, valvate in the bud; stamens twice as many as the petals and inserted with them; filaments free, filiform; anthers linear, attached on the back near the base, two-celled, the cells opening laterally, their connective apiculate at the apex; ovary four-celled below, only the apex one-celled, externally four-grooved, glandular at the base, gradually narrowed into the slender style;[1] stigma entire, subcapitate, ovules linear, solitary in each cell, pendulous from the apex of the axile placenta, anatropous, raphe dorsal, micropyle superior. Fruit drupaceous, ovoid or globose, one-celled; exocarp thick and succulent, endocarp crustaceous or subligneous; seed filling the cavity of the endocarp, pendulous, surrounded by a thin spongy coat; testa membranaceous; cotyledons elliptical; embryo minute, erect in the apex of the copious fleshy albumen; raphe terete.

Four or five species of Ximenia inhabit tropical shores in the two hemispheres. The most widely distributed of the species and the type of the genus, *Ximenia americana*, reaches southern Florida; *Ximenia ferox*[2] occurs in Hayti; *Ximenia parviflora*[3] inhabits southern Mexico; *Ximenia coriacea*[4] occurs in Brazil, and *Ximenia caffra*[5] in southern Africa.

The genus is named for Francesco Ximenes, a Dominican priest, born at Luna in Aragon, who lived for several years in Mexico, where in 1615 he published *Quatro libros de la naturaleza y virtudes de las plantas y animales que estan recevidos en el uso medicina en la Nueva España*, based on the collections and manuscripts of Francesco Hernandez, a Spanish physician sent by Philip II to Mexico in 1571 to investigate the medical properties of the flora.

C. S. S.

[1] As pointed out by Beccari (*Nuov. Giorn. Bot. Ital.* ix. 278, t. 11), the ovary of Ximenia is formed of four carpels completely united externally but internally united from the base for little more than one half their length, so that in the upper part the cavity is one-celled but in the lower part each carpel forms a cell. The style of Ximenia thus contains a cavity which is not connected with the four cells below, or, if such a connection exists, it is by an exceedingly narrow aperture.

[2] Poiret, *Lamarck Dict.* viii. 805 (1808). — Sprengel, *Syst.* ii. 217. — Valeton, *Crit. Overz. Olacin.* 77. — Urban, *Syn. Fl. Ind. Occ.* v. 186. This is an obscure and little known plant, and possibly belongs to another genus.

[3] Bentham, *Pl. Hartweg.* 7 (1839). — Hooker, *Icon.* iv. t. 350. — Hemsley, *Bot. Biol. Am. Cent.* i. 185. — Valeton, *Crit. Overz. Olacin.* 77.

[4] Engler, *Martius Fl. Brasil.* xii. pt. ii. 10, t. 2, f. 2 (1872). — Valeton, *Crit. Overz. Olacin.* 76 (in part).

[5] Sonder, *Linnæa*, xxiii. 21 (1850); Harvey & Sonder, *Fl. Cap.* i. 235. — Valeton, *Crit. Overz. Olacin.* 77. — Wood, *Trans. South African Phil. Soc.* xviii. pt. ii. 137.

XIMENIA AMERICANA, L.

XIMENIA AMERICANA, Linnæus, *Spec.* 1193 (1753). — Jacquin, *Hist. Select. Stirp. Am.* 53, t. 107. — Swartz, *Obs.* 149. — Poiret, *Lamarck Dict.* viii. 805. — Lamarck, *Ill.* ii. 435, t. 297, f. 1. — Willdenow, *Spec.* ii. pt. i. 338. — Lunan, *Hort. Jam.* ii. 156. — Descourtilz, *Fl. Med. Antill.* ii. 266, t. 132. — De Candolle, *Prodr.* i. 533. — Sprengel, *Syst.* ii. 216. — Cambessedes, *St. Hilaire Fl. Bras. Merid.* i. 341. — Schumacher, *Vidensk. Selsk. Abhand.* ser. 4, 213 (*Beskr. Guin. Pl.*). — Guillemin, Perrottet & A. Richard, *Tent. Fl. Senegal.* i. 102. — Roxburgh, *Fl. Ind.* ed. 2, ii. 252. — Wight & Arnott, *Prodr.* i. 89. — Spanoghe, *Linnæa*, xv. 177 (*Prodr. Fl. Timor.*). — Nuttall, *Sylva*, i. 124, t. 36. — Schnizlein, *Icon.* iii. t. 223, f. 1–9, 30, 31. — A. Richard, *Ess. Fl. Ile Cub.* 228; *Fl. Cub.* ii. 92. — Roemer, *Fam. Nat. Syn.* i. 22. — Schomburgk, *Faun. u. Fl. Brit. Guian.* 999. — Hooker, *Niger Fl.* 114. — Blume, *Mus. Bot. Lugd. Bat.* i. 247. — Miquel, *Fl. Ind. Bat.* i. pt. i. 786. — Pancher, *Cuzent Tahiti*, 229. — Baillon, *Adansonia*, ii. t. 9, f, 5, 6. — Bentham, *Fl. Austral.* i. 391. — Grisebach, *Fl. Brit. W. Ind.* 310; *Cat. Pl. Cub.* 118. — Chapman, *Fl.* 61. — Seemann, *Fl. Vit.* 30. — Oliver, *Fl. Trop. Afric.* i. 346. — Engler, *Martius Fl. Bras.* xii. pt. ii. 9, t. 2. — Nadeaud, *Emum. Pl. Tahiti*, 229. — Sauvalle, *Fl. Cub.* 21. — Masters, *Hooker f. Fl. Brit. Ind.* i. 574. — Baker, *Fl. Mauritius and the Seychelles*, 48. — Beccari, *Nuov. Giorn. Bot. Ital.* ix. 276, t. 11, f. 1–11. — Hemsley, *Bot. Biol. Am. Cent.* i. 185. — Valeton, *Crit. Overz. Olacin.* 74. — Drake del Castillo, *Fl. Polyn. Franç.* 29. — Trimen, *Fl. Ceylon*, i. 255. — Talbot, *Trees Bombay*, 44; *Forest Fl. Bombay Presidency and Sind*, i. 256. — Robinson, *Gray Syn. Fl. N. Am.* i. pt. i. 394. — Duss, *Ann. Inst. Col. Marseille*, iii. 326 (*Fl. Phaner. Antill. Franç.*). — Koorders, *Med.'s Lands Plantent.* xix. 391 (*Fl. N. O. Celebes*). — Coombs, *Trans. St. Louis Acad. Sci.* vii. 408. — Small, *Fl. Southeastern U. S.* 1104. — Cooke, *Fl. Bombay*, i. 220. — Pobeguin, *Fl. Guian. Franç.* 282. — Urban, *Syn. Fl. Ind. Occ.* v. 185. — Britton & Shafer, *N. Am. Trees*, 377, f. 332. — De Clercq, *Nieuw. Pl. Woordenb. Ned. Ind.* 345.

XIMENIA MULTIFLORA, Jacquin, *Enum. Pl. Carib.* 19 (1762); *Hist. Stirp. Am.* 106, t. 277, f. 31. — Lamarck, *Ill.* t. 297, f. 1. — *Spach. Hist. Vég.* xiii. 264. — Roemer, *Fam. Nat. Syn.* i. 22.

XIMENIA INERMIS, Linnæus, *Spec.* ed. 2, 497 (1762). — Crantz, *Inst.* ii. 381. — Poiret, *Lamarck Dict.* viii. 805. — Willdenow, *Spec.* ii. pt. i. 339. — Lunan, *Hort. Jam.* ii. 156. — De Candolle, *Prodr.* i. 533. — Macfadyen, *Fl. Jam.* i. 122. — Schomburgk, *Faun. u. Fl. Brit. Guian.* 999.

HEYMASSOLI SPINOSA, Aublet, *Pl. Guian.* i. 324, t. 135 (1775). — Lamarck, *Ill.* t. 297, f. 2.

HEYMASSOLI INERMIS, Aublet, *Pl. Guian.* i. 325 (1775).

XIMENIA ACULEATA, Crantz, *Inst.* ii. 381 (1766). — Tussac, *Fl. Antill.* iii. 100, t. 30.

XIMENIA SPINOSA, Salisbury, *Prodr.* 276 (1796).

XIMENIA ELLIPTICA, Forster, *Prodr.* 27 (1797). — Willdenow, *Spec.* ii. pt. i. 339. — La Billardière, *Sert. Austr.-Caled.* i. 34, t. 37. — Sprengel, *Syst.* ii. 217.

XIMENIA AMERICANA, α OVATA, De Candolle, *Prodr.* i. 533 (1824). — Valeton, *Crit. Overz. Olacin.* 75.

XIMENIA AMERICANA, β OBLONGA, De Candolle, *Prodr.* i. 533 (1824). — Grisebach, *Abhand. K. Gesell. Wiss. Gött.* xxiv. 149 (*Symbol. Fl. Argent.*). — Valeton, *Crit. Overz. Olacin.* 75.

XIMENIA MONTANA, Macfadyen, *Fl. Jam.* i. 121 (1837).

XIMENIA LAURINA, Delile, *Ann. Sci. Nat.* sér. 2, xx. 89 (1843).

XIMENIA FLUMINENSIS, Roemer, *Fam. Nat. Syn.* i. 22 (1846).

XIMENIA EXARMATA, F. Mueller, *Trans. Phil. Inst. Vict.* iii. 22 (*teste* Bentham, *Fl. Austral.* i. 391) [1859].

XIMENIA AMERICANA, δ LAURINA (Delile), Valeton, *Crit. Overz. Olacin.* 76 (1886).

XIMENIA AMERICANA, ϵ ELLIPTICA (Forster), Valeton, *Crit. Overz. Olacin.* 76 (1886).

XIMENIA AMERICANA, var. PUBENS, Grisebach, *Abhand. K. Gesell. Wiss. Gött.* xxiv. 149 (*Symbol. Fl. Argent.*) (1879).— Valeton, *Crit. Overz. Olacin.* 76.

XIMENIA CORIACEA, Valeton, *Crit. Overz. Olacin.* 76 (in part, not Engler) (1886).

Leaves oblong or elliptical, rounded and often emarginate and apiculate at the apex, gradually narrowed at the base, glabrous, bright green and lustrous above, pale below, from 3 to 6 centimetres long and from 1.5 to 3 centimetres wide, with slightly thickened revolute margins, prominent midribs and obscure primary veins; petioles slender, narrowly wing-margined at the apex, from 5 to 10 millimetres in length. Flowers bell-shaped, from 6 to 7 millimetres long, fragrant, on slender pedicels, in the axils of minute acuminate caducous bractlets, in three- or four-flowered clusters on peduncles from 5 to 7 millimetres long; calyx-lobes acute; petals oblong-obovate, narrowed and obtuse at the apex, yellowish white, leathery, conspicuously bearded from the base nearly to the apex. Fruit broadly ovoid to subglobose, yellow, 1.5 or 1.6 centimetres long, with thin acid flesh, and ovoid light red stone covered with minute pits and abruptly apiculate at the apex, and yellow seeds with bright orange-colored cotyledons.

A tree, in Florida occasionally 10 metres high, with a tall trunk from 6 to 8 centimetres in diameter, covered with red close astringent bark, spreading branches armed with stout straight spines mostly from 1.5 to 2 centimetres long,[1] and slender branchlets slightly angled and light reddish brown when they first appear, becoming terete and light gray or red-brown and marked by numerous lenticels, or more often a shrub. Flowers in April and May. Fruit ripens during the summer.[2]

The wood is very heavy, tough, hard, close-grained, compact, brown tinged with red, with lighter colored sapwood; it contains numerous regularly distributed open ducts and a few thin medullary rays. The specific gravity of the dry wood is 0.9196. Hydrocyanic acid has been obtained from the fruit.[3]

In Florida,[4] near Eustis, Lake County, which is its most northern reported station, *George B. Nash*, May, 1894 (No. 622), to the southern keys; of its largest size on the west coast and on Long Key in the Everglades, *E. A. Bessey*, May, 1908 (No. 101). *Ximenia americana* is common on the shores of the Antilles, ranging southward to Brazil. It is found in west tropical Africa, the Indian Peninsula, on many of the islands of the Indian Archipelago, in New Guinea, Australia, and on several of the islands of the South Pacific Ocean.

C. S. S.

[1] In Florida the branches are usually if not always armed, but farther south they are sometimes unarmed by the abortion of the spines.

[2] This tree was first described by Plumier in 1703 as *Ximenia aculeata flore villoso, fructu luteo, Nov. Pl. Am. Gen.* 6, t. 21; *Pl. Amer. Fasc.* ed. Burmann, 260, t. 261, f. 1. See also Linnæus, *Hort. Cliff.* 483.

[3] Flückiger & Hanbury, *Pharmacographia*, 222.

[4] *Ximenia americana* appears to have been first noticed in Florida somewhere on the upper St. John's River by William Bartram in 1774 (see *Travels*, 114).

EXPLANATION OF THE PLATE.

PLATE CLIV. XIMENIA AMERICANA.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. Vertical section of a flower, enlarged.
4. A petal, outer and inner surface, enlarged.
5. A pistil divided transversely, enlarged.
6. A stamen, front and rear views, enlarged.
7. A fruiting branch, natural size.
8. Vertical section of a fruit, enlarged.
9. A stone, enlarged.

C. E. Faxon del.

XIMENIA AMERICANA, L.

MISANTECA, CHAM. & SCHL.

(Lauraceæ.)

MISANTECA, Chamisso & Schlechtendal, *Linnæa*, vi. 367 (1831). — Nees von Esenbeck, *Laur. Expos.* 13; *Syst. Laur.* 272. — Meissner, *Gen.* 326; *De Candolle Prodr.* xv. pt. i. 95. — Endlicher, *Gen.* 319. — Bentham & Hooker, *Gen.* iii. 155. — Mez, *Jahrb. Bot. Gart. Berlin*, v. 100. — Engler & Prantl, *Pflanzenfam.* iii. pt. ii. 123.

SYMPHYSODAPHNE, A. Richard, *Fl. Cub.* iii. 190 (1855).

Trees with terete branchlets. Leaves alternate, entire, coriaceous, penniveined, persistent; stipules wanting. Flowers perfect, minute, apetalous, on slender pedicels, in terminal or axillary cymose panicles, the peduncles of the cymes and the pedicels from the axils of acuminate caducous bracts and bractlets; perianth fleshy, ovoid or obovoid, six-toothed; stamens three, extrorse, inserted near the middle of the perianth, united into a fleshy column furnished at the base with three pairs of glands, enclosing the pistil and slightly longer than the perianth; anthers two-celled, the cells united, opening from below upward by oblong persistent lids; ovary gradually narrowed into a thick style as long as the staminal tube; stigma capitate; ovule solitary, suspended, anatropous, micropyle superior. Fruit baccate, olive-shaped, surrounded at the base by the enlarged ligneous capsular perianth of the flower much thickened at the margin; pericarp thin, fleshy; endocarp thin, crustaceous; seed filling the cavity of the fruit; testa thin, crustaceous; hilum minute, apical; cotyledons plano-convex, fleshy; radicle superior, minute.

Three species of Misanteca are known; one, the type of the genus,[1] inhabits tropical Mexico, where a second species[2] occurs, and *Misanteca triandra* is found in Cuba and extends into southern Florida.

The generic name is derived from the Mexican name of the tree, Palo Misanteco, at Misantla, near the coast of the State of Vera Cruz, in Mexico, where the type species was discovered.

C. S. S.

[1] MISANTECA CAPITATA, Chamisso & Schlechtendal, *Linnæa*, vi. 367 (1831). — Gray, *Proc. Am. Acad.* v. 189. — Meissner, *De Candolle Prodr.* xv. pt. i. 96. — Hemsley, *Bot. Biol. Am. Cent.* iii. 71. — Mez, *Jahrb. Bot. Gart. Berlin*, v. 100.

[2] MISANTECA JÜRGENSENII, Mez, *Jahrb. Bot. Gart. Berlin*, v. 102 (1889).
Nectandra limbata, Meissner, *De Candolle Prodr.* xv. pt. i. 156 (in part, not Nees von Esenbeck) (1864).

MISANTECA TRIANDRA (Sw.), Mez.

Misanteca triandra (Swartz), Mez, *Jahrb. Bot. Gart. Berlin*, v. 103 (1889).

Laurus triandra, Swartz, *Prodr.* 65 (1788); *Fl. Ind. Occ.* ii. 706. — Willdenow, *Spec.* ii. 482. — Persoon, *Syn.* i. 449. — Poiret, *Lamarck Dict.* Suppl. iii. 324.

Endiandra jamaicensis, Sprengel, *Syst.* i. 176 (1825). — Rœmer & Schultes, *Mant.* iii. Addit. ii. 400.

Acrodiclidium jamaicensis, Nees von Esenbeck, *Syst. Laur.* 270 (1836). — Meissner, *De Candolle Prodr.* xv. pt. i. 85. — Grisebach, *Fl. Brit. W. Ind.* 280; *Pl. Wright.* 188; *Cat. Pl. Cub.* 111. — Sauvalle, *Fl. Cub.* 143.

Symphysodaphne cubensis, A. Richard, *Fl. Cub.* iii. 190, t. 67 (1855). — Meissner, *De Candolle Prodr.* xv. pt. i. 176.

Aydendron? cubense, A. Richard, *Fl. Cub.* iii. 187 (1855).

Leaves elliptical-lanceolate, ovate or broadly elliptical, abruptly long-pointed and acuminate at the apex and gradually narrowed and cuneate at the base; deeply tinged with red and villose on the lower side of the midribs when they unfold, soon becoming glabrous, and at maturity dark green and lustrous on the upper surface, pale on the lower surface, from 8 to 12 centimetres long and from 3.5 to 4 centimetres wide, with slightly undulate margins, prominent midribs, slender primary veins, and reticulate veinlets conspicuous on the lower surface; petioles stout, narrowly wing-margined at the apex, at first pubescent, becoming glabrous, from 8 to 10 millimetres in length. Flowers glabrous or puberulous, purplish, from 2 to 2.5 millimetres long, in three- to five-flowered cymes, on slender peduncles, in pubescent panicles shorter than the leaves; tube of the perianth funnel-form, the lobes equal, triangular, acute; staminal column pilose; ovary glabrous. Fruit in few-fruited clusters, on much elongated and thickened pedicels, ovoid, acute, dark blue, 2 centimetres long, 1.5 centimetres in diameter; cupule light red, thickened and verrucose, acute at the base, the margin reflexed, thin and entire on the inner edge, thick and crenulate on the outer edge; seed light brown, slightly ridged when dry.

A tree, in Florida about 15 metres high, with a tall trunk 4.2 decimetres in diameter, covered with light red-brown bark, small spreading and pendent branches forming a broad round-topped handsome head, and slender red branchlets pubescent when they first appear, soon becoming glabrous and marked by numerous large pale lenticels. Flowers in September. Fruit ripens in early summer.

Florida, where only two individuals have been seen: edge of a hammock by roadside between Miami and Homestead, Dade County, *Miss O. Rodham*, June 2, 1910; *E. Simmonds*, July 6 and September 1, 1910 (in herb. Arnold Arboretum); also in Cuba.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLV. MISANTECA TRIANDRA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A staminal column, enlarged.
5. A pistil, enlarged.
6. A fruiting branch, natural size.
7. Vertical section of a fruit, natural size.
8. A seed, natural size.
9. An embryo, natural size.

C. E. Faxon del.

MISANTECA TRIANDRA, Mez.

HAMAMELIS VERNALIS, SARG.

HAMAMELIS VERNALIS, *n. sp.*

Leaves oblong-obovate, acute or rounded at the apex, cuneate and entire below and sinuate-dentate above the middle; when they unfold glabrous above and coated on the midribs and veins below with stellate hairs mixed with fascicles of long matted straight hairs, or stellate-pubescent on the two surfaces, and at maturity thin, dark yellow-green above, pale and often glaucous, especially early in the season, on the lower surface, and more or less rusty-pubescent or nearly glabrous on the under side of the midribs and veins, from 8 to 10 centimetres long and from 5 to 7 centimetres wide; petioles stout, coated with matted pale or rusty hairs; stipules lanceolate, acuminate, scarious, hoary-pubescent, 5 or 6 millimetres in length, caducous. Flowers in axillary clusters, on stout rusty-tomentose peduncles; calyx-lobes rounded, ciliate on the margins, tomentose on the outer surface, dark red on the inner surface; petals light yellow. Fruit about 1.5 centimetres long; seeds acute, dark chestnut-brown or nearly black.

A shrub, rarely more than 2 metres high, spreading by stolons into broad thickets, with small pale gray-brown stems and slender branchlets densely stellate-pubescent and covered with long pale deciduous hairs when they first appear, becoming glabrous in their third year. Flowers from the end of January until the end of March. Fruit ripens in early summer.

Gravelly banks of streams, often inundated. Missouri: tributaries of the Upper Meramec River, *G. Engelmann*, November, 1845; Pilot Knob, Iron County, *G. Engelmann*, September 9, 1859, *N. M. Glatfelter*, August 20, 1905 (No. 179); Ironton, Iron County, *Russell*, July, 1897; Eastern Iron County, *W. Trelease*, August 18, 1907 (No. 424); Carter County, *H. Eggert*, June 6, 1893; Williamsville, Wayne County, *H. Eggert*, June 21, 1893, *B. F. Bush*, April 1, 1893, *W. Trelease*, September 9, 1897 (No. 425); Shannon County, *B. F. Bush*, October 21, 1893; Pleasant Grove, Ripley County, *K. K. Mackenzie*, July 25, 1897 (No. 419); Galena, Stone County, *E. J. Palmer*, November 18, 1905 (No. 16) (all in herb. Missouri Bot. Gard.); near Monteer, Shannon County, *B. F. Bush*, August, 1894; Monteer, *B. F. Bush* (Nos. 4875, 5344, 5393); Branson, *B. F. Bush*, October 28, 1908 (No. 5385); Grandin, Carter County, *B. F. Bush*, May 7, 1905 (No. 2731); Swan, Taney County, *B. F. Bush*, May 7, 1905 (Nos. 2731, 4854 type for fruit, 4915 and 5394 type for flowers); Eagle Rock, *B. F. Bush* (Nos. 102, 3239) (all in herb. Arnold Arboretum). Arkansas: Eureka Springs, Carroll County, *B. F. Bush*, May 8, 1902 (No. 1512), *N. M. Glatfelter*, July 17, 1898; Sulphur Potash Springs, *W. Trelease*, September 3, 1897; Hot Springs, Garland County, *W. Trelease*, October 3, 1898; Mt. Mena, *W. Trelease*, June 1, 1898 (all in herb. Mo. Bot. Gard.); Eureka Springs, Carroll County, *C. S. Sargent*, May 8, 1902 (in herb. Arnold Arboretum). Oklahoma: Cherokee Nation, *J. W. Blankinship*, August 19, 1895 (in herb. Gray).

The different species of Hamamelis offer no good morphological characters, the structure of the flowers, fruit and seeds being the same in them all. The plant, however, from southern Missouri, Arkansas and Louisiana is so distinct in its time of flowering, in the bright red color of the inner surface of the calyx-lobes, in the pale color of the under surface of the leaves, and in the amount and persistency of the pubescence on the leaves and branches that it appears desirable to distinguish it specifically from *Hamamelis virginiana*. The habit, too, of spreading by stolons into great thickets, and the fact that it grows so far as I have seen it only in the gravelly beds and margins of streams, also seem to separate it from the eastern species, which inhabits rich woodlands and upland pastures. In the color of the inner surface of the calyx-lobes and in its time of flowering *Hamamelis vernalis* resembles the Japanese species.

A specimen in the herbarium of the Missouri Botanic Garden collected by G. C. Nealy at Beaumont, Texas, December 2, 1884, with fragmentary flowers, is perhaps this species, judging by the pubescent branchlets. This is the only specimen of Hamamelis from Texas which I have seen.

EXPLANATION OF THE PLATE.

PLATE CLVI. HAMAMELIS VERNALIS.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A stamen, side view, enlarged.
4. A fruiting branch, natural size.
5. A fruit, enlarged.
6. A seed, enlarged.

C. E. Faxon del.

HAMAMELIS VERNALIS, Sarg.

MALUS GLAUCESCENS, REHD.

MALUS GLAUCESCENS, *n. sp.*

Leaves triangular-ovate or ovate, acute, short-acuminate or rounded at the apex, truncate or subcordate at the base, those of the flowering branchlets more or less lobed and coarsely serrate, with abruptly acuminate teeth, their lobes triangular, broadly ovate and abruptly acuminate, the lowest pair usually the largest; when they unfold bronze color and covered with thin floccose tomentum, soon becoming quite glabrous, dull yellowish green on the upper surface, glaucescent on the lower surface, from 4 to 9 centimetres long and from 3 to 8 centimetres wide, with four to seven pairs of veins impressed above and prominent beneath; petioles slender, slightly villose at first, soon becoming glabrous, from 2 to 4 centimetres in length; stipules filiform, purplish, slightly villose or glabrescent, about 1 centimetre long, deciduous. In the autumn the leaves turn dull yellow or dark purple before falling. Flowers from about 3.5 to 4 centimetres in diameter, appearing after the leaves are almost fully grown, on slender glabrous pedicels from 2 to 3 centimetres long, in from five- to seven-flowered umbel-like racemes; calyx thinly coated on the outer surface with floccose caducous pubescence, or glabrous or nearly so, the lobes oblong-lanceolate, long-acuminate, densely tomentose on the inner surface, slightly longer than the obconic tube; petals oval, rounded at the apex, abruptly contracted below into a long claw, white or rose color, from 1.5 to 2.2 centimetres long and from 1.1 to 1.4 centimetres broad; stamens about one third shorter than the petals; styles five, about as long as the stamens, densely villose below and connate at the base for about one fourth of their length. Fruit depressed-globose, with a shallow uniform concave depression at the base and a shallow only slightly corrugated cavity at the apex, yellow when ripe, fragrant, covered with a waxy viscid exudation, from 3 to 4 centimetres in diameter and from 2.5 to 3 centimetres high.

An arborescent shrub or small tree, rarely exceeding 5 metres in height, with a slender trunk sometimes 2 metres tall and 1.5 decimetres in diameter, spreading spiny branches forming an open head, slender branchlets nearly glabrous or, when they first appear, slightly pubescent, and bright red-brown in their first and second years; older branches clothed with smooth dark grayish brown bark marked with yellowish lenticels. Bark of the trunk dark gray with shallow longitudinal fissures, finally separating into thin small scales. Winter-buds conical, light reddish brown, glabrous, hardly more than 5 millimetres in length, with several oblong-lanceolate acute scales, those of the outer ranks villose on the inner surface near the apex. Flowers appear after the middle of May in the north and at the beginning of May in North Carolina, and about a week earlier than those of *Malus coronaria*. The fruit ripens and falls in September two or three weeks earlier than that of *Malus coronaria*.

New York: Rochester, Maple Grove Park, *J. Dunbar*, May 25, 1904 and 1905 (type); Seneca Park, May 19, 1905, September 26, 1906, October 26, 1910; South Buffalo, *B. H. Slavin*, September 1, 1910; Cattaraugus County, Salamanca, October 6, 1910; Ontario County, Canandaigua, September 2, 1910 (all in herb. Arnold Arboretum). Pennsylvania: Alleghany County, South Fayetteville Township, *S. W. Knipe*, May, 1871, and May, 1900; Shafer Farm near Carnot, *J. A. Shafer*, May 18, 1902 (in herb. Carnegie Mus.). North Carolina: Haywood County, Jonathan's Creek, *C. S. Sargent*, September, 1888; Biltmore, May 3 and September 4, 1897 (No. 1297 B); Biltmore, October 5, 1910, *T. G. Harbison* (Nos. 191, 192). Alabama: De Kalb County, Valleyhead, *T. G. Harbison*, October 7, 1910 (Nos. 194 and 196) (in herb. Arnold Arboretum).

Malus glaucescens is most nearly related to *Malus coronaria*, which is readily distinguished by its less distinctly lobed leaves usually rounded at the base and pale yellowish green on their under surface, and by its tomentose shorter and stouter petioles; the pubescence of the under surface of the leaves disappears usually later in *Malus coronaria* and is denser and remains longer on the veins and on the petioles, while in *Malus glaucescens* the pubescence is thinner and more floccose and the leaves quickly become entirely glabrous. The fruit of *Malus coronaria* ripens later and is subglobose greenish or greenish yellow; the cavity at the apex is rather deep and uneven, with separate corrugations, which may even extend into obscure ribs. The specimens from Rochester which I consider represent the type have the calyx coated with a thin floccose caducous tomentum, while the calyx of the specimens from Pennsylvania and North Carolina is quite glabrous.

Probably to this species belongs a form with densely villous calyx occurring in southwestern Ontario. Of this form I have seen the following specimens, which, however, are so incomplete that it is not possible to place them definitely.

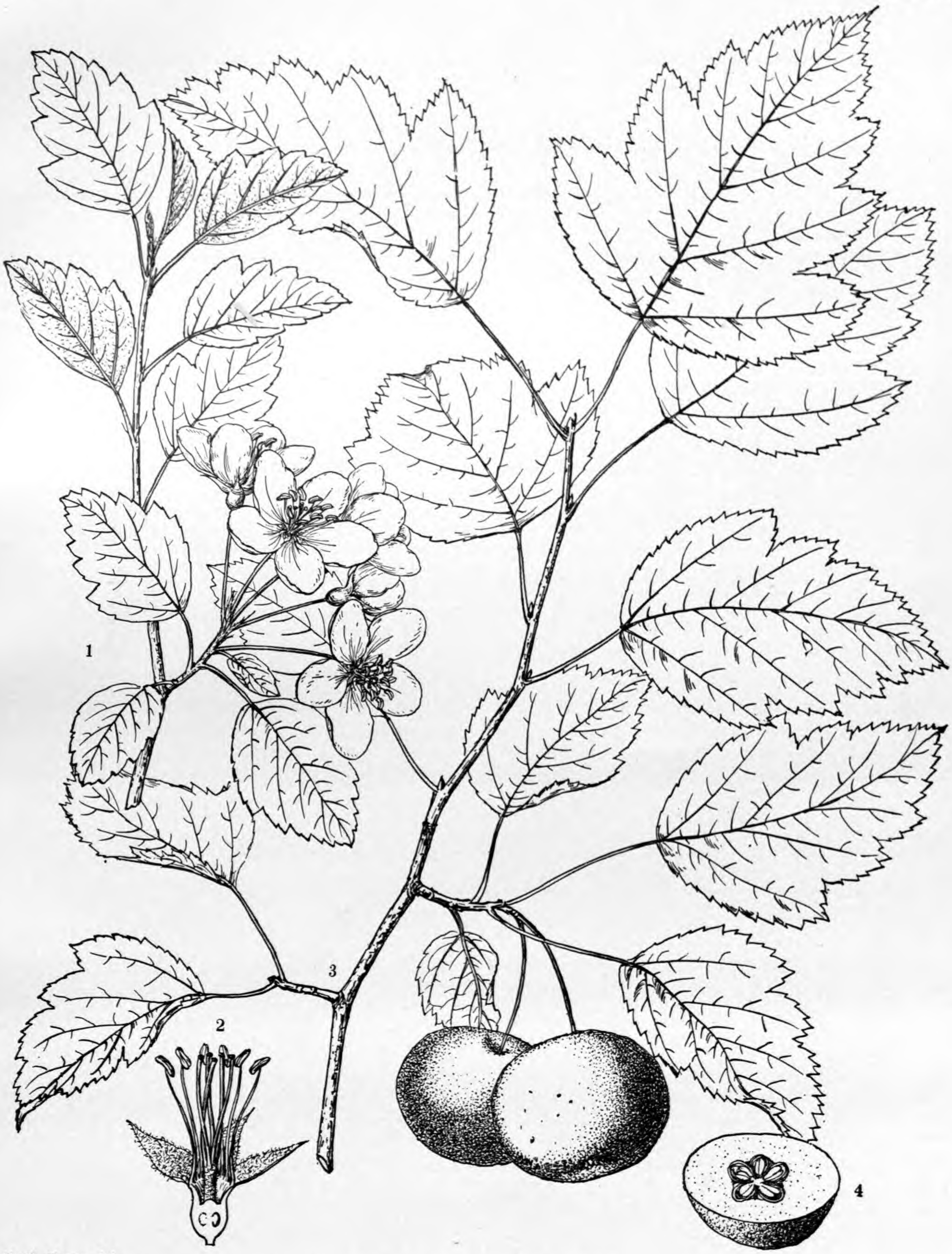
Woods, Niagara, *J. Macoun*, May 31, 1901 (ex herb. Geol. Survey, Canada, No. 34,405); Wallaceburgh, *J. Macoun*, June 17, 1901 (ex herb. Geol. Survey, Canada, No. 34,486); Amesburgh, *J. Macoun*, June 10, 1892 (Fl. Can. No. 81); Fort Detroit, *W. Boott*, May 23, 1869 (all in herb. Gray). Here also belongs probably a cultivated plant from Fairmount Park, Philadelphia, *A. MacElwee* (Nos. 2166, 2166 A in herb. Acad. Nat. Sci. Phila.), May 6 and 15, 1901.

ALFRED REHDER.

EXPLANATION OF THE PLATE.

PLATE CLVII. MALUS GLAUCESCENS.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A fruiting branch, natural size.
4. Cross section of a fruit, natural size.



C. E. Faxon del.

MALUS GLAUCESCENS, Rehd.

MALUS LANCIFOLIA, REHD.

MALUS LANCIFOLIA, *n. sp.*

Leaves, ovate-lanceolate to oblong-lanceolate, acute or shortly acuminate at the apex, rounded or broadly cuneate at the base, finely or sometimes more coarsely and frequently doubly serrate, with short teeth pointing forward, and occasionally furnished with a few larger teeth; when they unfold covered with thin floccose tomentum, soon becoming quite glabrous, bright yellowish green on both sides, from 3.5 to 8 centimetres long, from 1.5 to 3 centimetres broad, with from eight to ten pairs of veins; petioles slender, slightly villose while young, soon becoming glabrous, from 1 to 2 centimetres in length; leaves of leading shoots, ovate or oblong-ovate, slightly lobed, more densely pubescent on the lower surface, from 6 to 9 centimetres long and from 4 to 6 centimetres broad, with thin midribs and five to seven pairs of veins slightly villose even at maturity, their petioles stouter, coated with dense villose tomentum partly persistent until autumn, usually only about 1 centimetre in length; stipules filiform, pubescent, about 5 millimetres long, early deciduous. Flowers from 3 to 3.5 centimetres in diameter, on slender glabrous pedicels, about 3 centimetres in length, in three- to six-flowered umbel-like racemes; calyx-tube obconic, glabrous on the outer surface, the lobes oblong-lanceolate, longer than the tube, glabrous on the outer surface, coated with villose tomentum on the inner surface; petals oval, 1.5 centimetres long, rounded at the apex, abruptly contracted below into a long narrow claw, glabrous, white or rose color; stamens shorter than the petals; styles five, as long as the stamens, densely villose below the middle. Fruit subglobose, from 2.5 to 3 centimetres in diameter, on slender drooping pedicels from 2 to 3 centimetres long, green covered by a waxy exudation.

A small tree, sometimes 7 metres high, with a trunk 3.7 decimetres in diameter, and spreading spiny branches forming an open pyramidal head, the branchlets slightly pubescent or nearly glabrous when they first appear, becoming reddish brown at the end of their first year, older branches covered with a dark brownish gray bark remaining smooth for a long time; bark of the trunk brownish gray with shallow longitudinal fissures, separating in thin plates and disclosing a brownish red inner bark. Winter-buds glabrous, purplish brown. Flowers appear in May. Fruit ripens at the end of September.

Pennsylvania: Lackawanna County, Scranton, June 9 and September 20, 1907, November 14, 1910, Spring Brook, *A. Twining*, May, 1907 (in herb. Arnold Arboretum); Munro County, Cranberry Marsh, *B. Long* and *E. B. Bartram*, June 1, 1907 (in herb. Acad. Nat. Sci. Phila.); Crawford County, near Hartshorn, *O. E.* and *G. K. Jennings*, May 29 and 31, 1909 (in herb. Carnegie Mus.); Somerset County, near Buckstown, attitude from 650 to 800 metres, *H. Brown* and *C. F. Saunders*, July 12, 1898, Sand Patch, summit of the Alleghany Mountains, *C. F. Saunders*, July 9, 1898 (in herb. Acad. Nat. Sci. Phila.); Alleghany County, *T. C. Porter*, May 10, 1872 (in herb. Arnold Arboretum), Powers Run, *O. E. Jennings* and *G. E. Kinzer*, May 25, 1904, near Herriotsville, *S. W. Knipe*, May, 1871, South Fayette, *S. W. Knipe*, May 15, 1900; Fayette County, Laurelvilla, *O. E. Jennings*, June 24, 1904; Westmoreland County, Avonmore, *K. R. Holmes*, May 8, 1901, Hillside Station, *O. E. Jennings*, May 25, 1907, Hillside Station, *O. E.* and *G. K. Jennings*, September 16, 1909 (all in herb. Carnegie Mus.). West Virginia: Randolph County, near Elkins, *A. Rehder*, August 24, 1907; Greenbrier County, White Sulphur Springs, *A. Rehder*, August 31, 1907 (in herb. Arnold Arboretum). Virginia:

Pulaski County, along Peak Creek on Peak Mountain, *J. K. Small*, July 16, 1892. Fayette County, Ohio, Pyle, July 3–8, 1905. Illinois: Wolf Lake, May, 1880 (all in herb. Carnegie Mus.): Missouri, Jackson County, near Independence, *B. F. Bush*, May 30 and June 10, 1894 (Nos. 281, 284), near Courtney, May 23, 1894 (No. 283), April 29, 1906–10 (Nos. 283, 3869, 6426), (all in herb. Arnold Arboretum).

Malus lancifolia has usually been confounded with *Malus angustifolia*, which is readily distinguished by its oblong more crenately serrate and usually more coriaceous leaves cuneate at the base and rounded at the apex, at least those on the flowering shoots, by the broader and shorter calyx-lobes, by the pubescence only on the lower third of the style, by the form of the petals which are more gradually narrowed into the claws, and by the globose-ovoid, not depressed-globose, fruit.[1]

ALFRED REHDER.

[1] *Malus coronaria* Miller and the allied species, all natives of eastern North America, form a very distinct group of the genus Malus which may be designated as *Coronariæ*, characterized by leaves conduplicate in the bud and more or less lobed at least on vigorous shoots, by the persistent calyx and by the red or reddish anthers and the free apex of the core of the fruit. By the persistent calyx they are easily distinguished from *Malus fusca* Rafinesque of northwestern North America, and from *Malus Toringo* and its allies from eastern Asia, which also have the leaves conduplicate in the bud with a tendency to become lobed; by the conduplicate leaves and by the tendency to lobing the *Coronariæ* are distinguished from all other species of Malus with a persistent calyx, which have the leaves convolute in the bud and always unlobed. The *Coronariæ*, to which belong the two new species here described, *Malus coronaria* Miller, the type of the group, *Malus angustifolia* Michaux, and *Malus ioensis* Britton, are very variable and need more thorough study, but with the material at hand it is impossible to obtain a clear conception of the variation and the range of the different species. Most of the forms are not yet in cultivation and are only incompletely represented in herbaria, particularly the fruits, which apparently present some good characters. I venture, however, to describe the following varieties, of whose relationship there does not seem to be any doubt.

MALUS CORONARIA var. HOOPESII, *n. var.*

This differs from the type chiefly in its pubescent calyx, in the oval to elliptic, not or only slightly lobed leaves, and by the larger fruit measuring about 5 centimetres in diameter. This variety is only known in cultivation. It was received at the Arnold Arboretum from Hoopes Brothers & Thomas of West Chester, Pennsylvania, in 1876, and has grown into a large tree. The only presumably wild specimen I have seen approaching this variety in its slightly villose calyx is one from Wheeling, West Virginia, *G. Guttenberg*, May 7, 1878 (in herb. Carnegie Mus.).

MALUS IOENSIS var. PALMERI, *n. var.*

Leaves oblong, rounded at the apex and usually mucronate or rarely acutish, broadly cuneate or occasionally nearly rounded at the base, crenately serrate or, on vigorous shoots, doubly serrate or rarely slightly lobed; when they unfold sparingly hairy on the upper surface, soon becoming quite glabrous, yellowish green and covered below with a close whitish tomentum more or less persistent until maturity, at least on the veins, from 3 to 6 centimetres long and from 1.5 to 3 centimetres broad; petioles tomentose, from 1 to 1.5 centimetres in length. Flowers about 3 centimetres in diameter on tomentose pedicels in three- to five-flowered umbel-like racemes; calyx tomentose on the outer surface, the lobes narrowly triangular, ovate, attenuated into a glabrous mucro about as long as the tube; petals broadly oval or obovate, rounded at the apex, narrowed at the base into a long claw, about 1.5 centimetres long and 1 centimetre broad; stamens about half as long as the petals, with purple anthers, shorter than the styles or as long. Fruit subglobose, green at maturity, only very slightly covered with an exudation, from 2.5 to 3 centimetres in diameter.

A small slender tree, from 3 to 5 metres high, with stems covered like the spiny zigzag branches with dark gray-brown bark exfoliating in thin plates, exposing the orange or cinnamon-colored inner bark, and stout branchlets densely tomentose when they first appear, becoming glabrous or nearly so at the end of their first season and then reddish or gray-brown. Winter-buds small, with grayish pubescent scales.

Missouri: Jasper County, near Webb City, along small streams, *E. J. Palmer*, September 22, 1901, and April 28, 1909 (No. 1795).

This variety differs from the type chiefly in its smaller oblong more thinly pubescent leaves which are rounded at the apex, those of the flowering shoots being only crenately serrate and not lobed. It is named for Mr. E. J. Palmer of Webb City, Missouri, who has for several years been actively engaged in collecting and studying the plants of the interesting flora of southwestern Missouri.

MALUS IOENSIS var. TEXANA, *n. var.*

Leaves oval, rarely oblong, irregularly or doubly serrate, on vigorous shoots sometimes ovate or broadly ovate and slightly lobed, or obovate and irregularly doubly serrate, acute or rarely rounded at the apex, and cuneate or rounded at the base; when unfolding slightly floccose above, soon becoming quite glabrous except on the midrib, yellowish green, grayish-tomentose beneath, from 3 to 6 centimetres long and from 1.5 to nearly 4 centimetres broad; petioles densely tomentose, from 1 to 1.5 centimetres in length; stipules filiform, villose, about 5 millimetres long. Flowers about 3 centimetres in diameter, on tomentose pedicels from 2 to 2.5 centimetres long in two- to four-flowered umbels; calyx densely white-tomentose, the lobes triangular-ovate, about

as long as the tube ; petals red in bud, becoming light pink when expanding and finally nearly white, broadly oval, rounded at the apex and at the rounded or subcordate base abruptly contracted into a slender claw ; stamens one third shorter than the petals, with purple anthers ; styles shorter than the stamens, villose at the lower third. Fruit subglobose, on slender villose pedicels about 2 centimetres in length, with shallow cavities at the base and apex, crowned by the persistent tomentose calyx-lobes, about 2.5 centimetres in diameter, clothed near the base and the apex with the persistent tomentum.

A small, intricately branched tree, from 4 to 5 metres high, or often a shrub spreading into great thickets, with densely tomentose branchlets, becoming glabrescent toward the end of their first year or sometimes not until the second year, and pale red-brown or grayish brown. The bark of the trunk is light gray, peeling off in thin plates, exposing the cinnamon brown inner layers ; winter-buds small and tomentose.

Texas : Blanco County, *J. Reverchon*, July, 1885 ; Kendall County, near Boerne, *T. H. Hastings*, October 7 and October 10, 1910, *C. S. Sargent*, March 25, 1911 ; Kern County, Kerrville, *B. Mackensen*, 1910.

This variety differs chiefly from the type in its smaller and much broader leaves not at all or only slightly lobed and densely villose even at maturity, and in its often shrubby habit. It marks the southwestern limit of the range of *Malus ioensis* and of the whole group of *Coronariæ*.

The variation in *Malus ioensis* seems to be very wide. Specimens collected by B. F. Bush near Dodson, Missouri (Nos. 744, 746), and near Independence, Missouri (Nos. 754, 758, 759), approach the variety *Palmeri*, while Bush's specimens from Monteer, Missouri (No. 6099), have the leaves only slightly pubescent, strongly lobed on vigorous shoots, oblong-ovate and only serrate on weaker branches, thus approaching in stages *Malus lancifolia ;* specimens similar to the last were collected by G. W. Letterman near Allenton, Missouri, in 1883. Among the specimens collected in Wisconsin in 1893 by M. E. Gilbreth, J. G. Jack and A. B. Seymour are some with quite glabrous leaves and nearly glabrous branchlets, but the shape of the leaves and of the fruits shows that they belong to *Malus ioensis*. All these forms need further investigation and study based on more extensive material than we at present possess.

EXPLANATION OF THE PLATE.

Plate CLVIII. Malus lancifolia.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A fruiting branch, natural size.
4. Vertical section of a fruit, natural size.

C. E. Faxon del.

MALUS LANCIFOLIA, Rehd.

CRATÆGUS VIBURNIFOLIA, SARG.

(Molles.)

CRATÆGUS VIBURNIFOLIA, *n. sp.*

Leaves elliptical to ovate, oval or slightly obovate, acute at the apex, concave-cuneate at the entire base, coarsely often doubly serrate, with straight glandular teeth, and slightly and irregularly divided above the middle into two or three pairs of small acute lobes; more than half-grown when the flowers open about the 20th of March and then thin, yellow-green and roughened above by short white hairs and hoary-tomentose below, and at maturity thick, deep green, very lustrous and scabrate on the upper surface, coated on the lower surface with matted pale hairs, from 6 to 9 centimetres long and from 5 to 7 centimetres wide, with prominent midribs and primary veins; petioles slightly wing-margined at the apex, densely hoary-tomentose early in the season, becoming glabrous, from 1 to 3.5 centimetres in length. Flowers from 1.8 to 2 centimetres in diameter, on long slender tomentose pedicels, in wide lax mostly five- to twelve-flowered corymbs, with large lanceolate to spatulate foliaceous bracts and bractlets slightly serrate above the middle and generally persistent until after the petals fall; calyx-tube narrowly obconic, thickly coated with matted white hairs, the lobes gradually narrowed from the base, long, slender acuminate, laciniately glandular-serrate, slightly villose on the outer surface, densely villose on the inner surface, reflexed after anthesis; stamens twenty; anthers white; styles four or five. Fruit ripening in October, on long slender drooping slightly hairy pedicels in few-fruited clusters, subglobose, bright canary yellow, from 2 to 2.5 centimetres in diameter; calyx little enlarged, with a wide deep cavity broad and tomentose in the bottom and spreading lobes; flesh thick, light yellow, soft and succulent; nutlets four or five, gradually narrowed and rounded at the ends, irregularly ridged on the back, with a broad grooved ridge, from 7 to 8 millimetres long and from 4.5 to 5 millimetres wide.

A tree, from 8 to 10 metres high, with a tall trunk sometimes 3 decimetres in diameter, covered with gray scaly bark, large ascending and spreading branches forming an open irregular head, and stout nearly straight unarmed branchlets thickly coated with hoary tomentum when they first appear, becoming purple, lustrous and nearly glabrous at the end of their first season and dark-brown or gray-brown the following year.

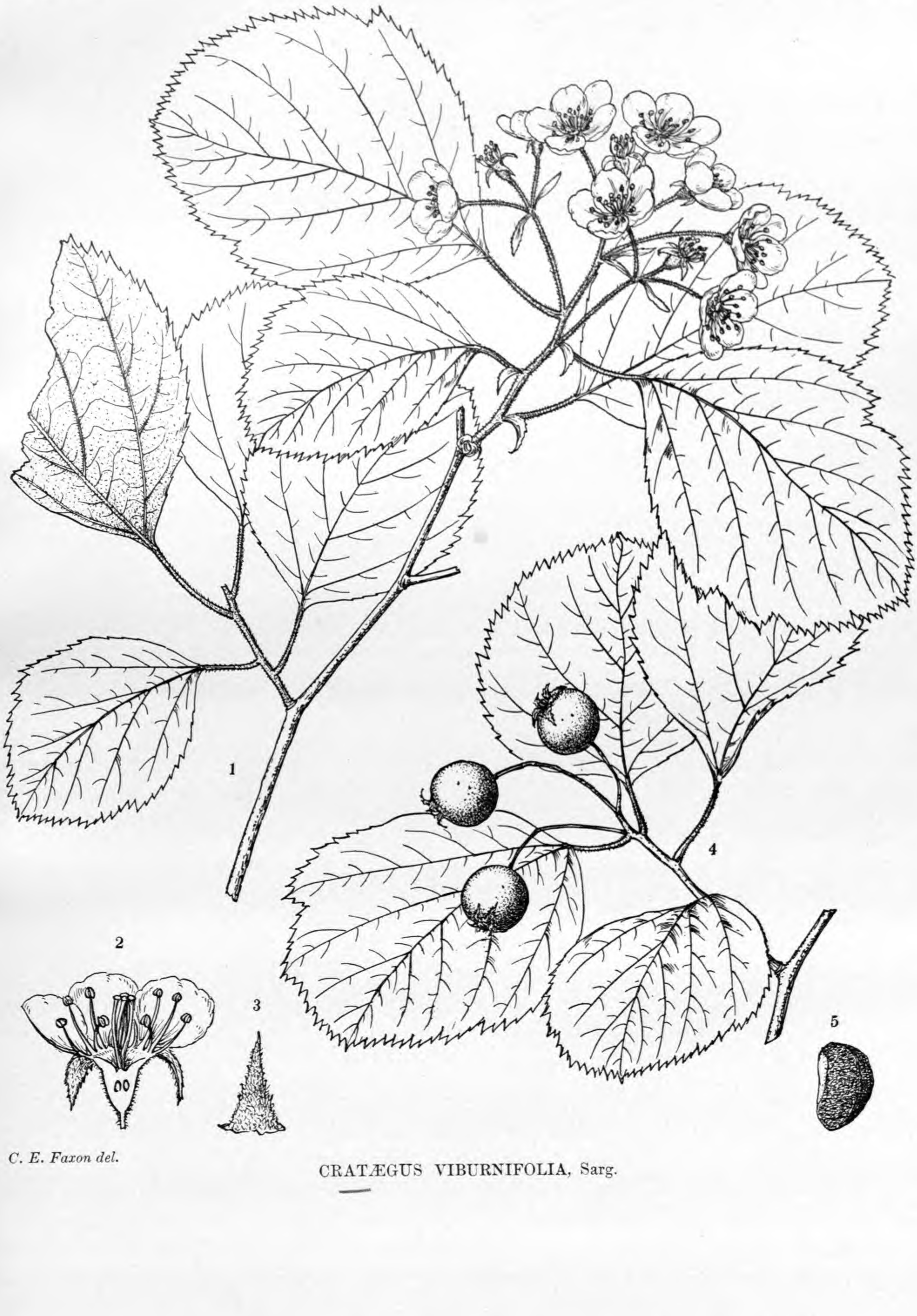
Borders of woods in low ground, valley of the Brazos River, between Columbia and Brazoria, Brazoria County, Texas, *B. F. Bush*, September 25, 1901, March 27, 1902, *B. F. Bush* and *C. S. Sargent*, March 23, 1909 (No. 11 type, and Nos. 439, 912, 1219, 1516 all in herb. Arnold Arboretum).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLIX. CRATÆGUS VIBURNIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. A nutlet, enlarged.



C. E. Faxon del.

CRATÆGUS VIBURNIFOLIA, Sarg.

CRATÆGUS INVISA, SARG.

(Molles.)

CRATÆGUS INVISA, *n. sp.*

Leaves ovate to oval, acute or acuminate at the apex, cuneate or rounded at the base, coarsely often doubly serrate, with broad straight glandular teeth, and slightly divided usually only above the middle into three or four pairs of small acuminate lobes; when they unfold densely tomentose below and villose above, about one third grown when the flowers open at the end of March and then thin, dark yellow-green and roughened on the upper surface by short white hairs and coated on the lower surface with long matted white hairs, and at maturity thin, yellow-green, scabrate and lustrous above, hairy below on the midribs and veins, from 6 to 7 centimetres long and from 5 to 6 centimetres wide; petioles slender, slightly wing-margined at the apex, covered with pale hairs early in the season, becoming nearly glabrous, from 1.5 to 2.5 centimetres in length; leaves on vigorous shoots broadly ovate, acuminate, abruptly cuneate at the wide base, more coarsely serrate, deeply divided into acute lateral lobes, often from 9 to 10 centimetres long and from 8 to 9 centimetres wide, with slender villose petioles from 4 to 4.5 centimetres in length, and lunate coarsely serrate persistent stipules. Flowers from 1.6 to 1.8 centimetres in diameter, on slender pedicels thickly coated like the wide calyx-tube with long matted white hairs, in broad mostly seven- to twelve-flowered corymbs, with small oblong-obovate acute bracts and bractlets fading brown and persistent until after the flowers open; calyx-lobes gradually narrowed from the base, short, broad, acuminate, laciniately glandular-serrate, thickly covered with long white hairs on the outer surface, villose above the middle on the inner surface, reflexed after anthesis; stamens twenty; anthers white; styles three to five, surrounded at the base by a wide ring of long white hairs. Fruit ripening in October, on long slender slightly hairy pedicels, in erect or spreading few-fruited clusters, short-oblong, full and rounded at the ends, orange-red, marked by large pale dots, slightly hairy at the ends, from 1 to 1.2 centimetres in diameter; calyx little enlarged, with a broad shallow cavity pointed in the bottom, and spreading lobes dark red on the upper side below the middle and villose toward the apex; flesh thin, yellow, dry and mealy; nutlets three to five, rounded at the ends, broader at the apex than at the base, rounded and only slightly grooved on the back, from 5 to 5.5 millimetres long and about 3 millimetres wide, the prominent hypostyle extending below the middle of the nutlet.

A tree, sometimes 10 metres high, with a tall trunk covered with dark brown bark broken into small closely appressed plate-like scales, large spreading branches forming a wide irregular head, and stout slightly zigzag branchlets clothed when they first appear with hoary tomentum, dull gray-brown marked by small pale lenticels and slightly pubescent, or villose on the vigorous shoots, at the end of their first season and dark gray the following year, and unarmed or armed with occasional slender straight chestnut-brown spines from 2.5 to 3 centimetres long.

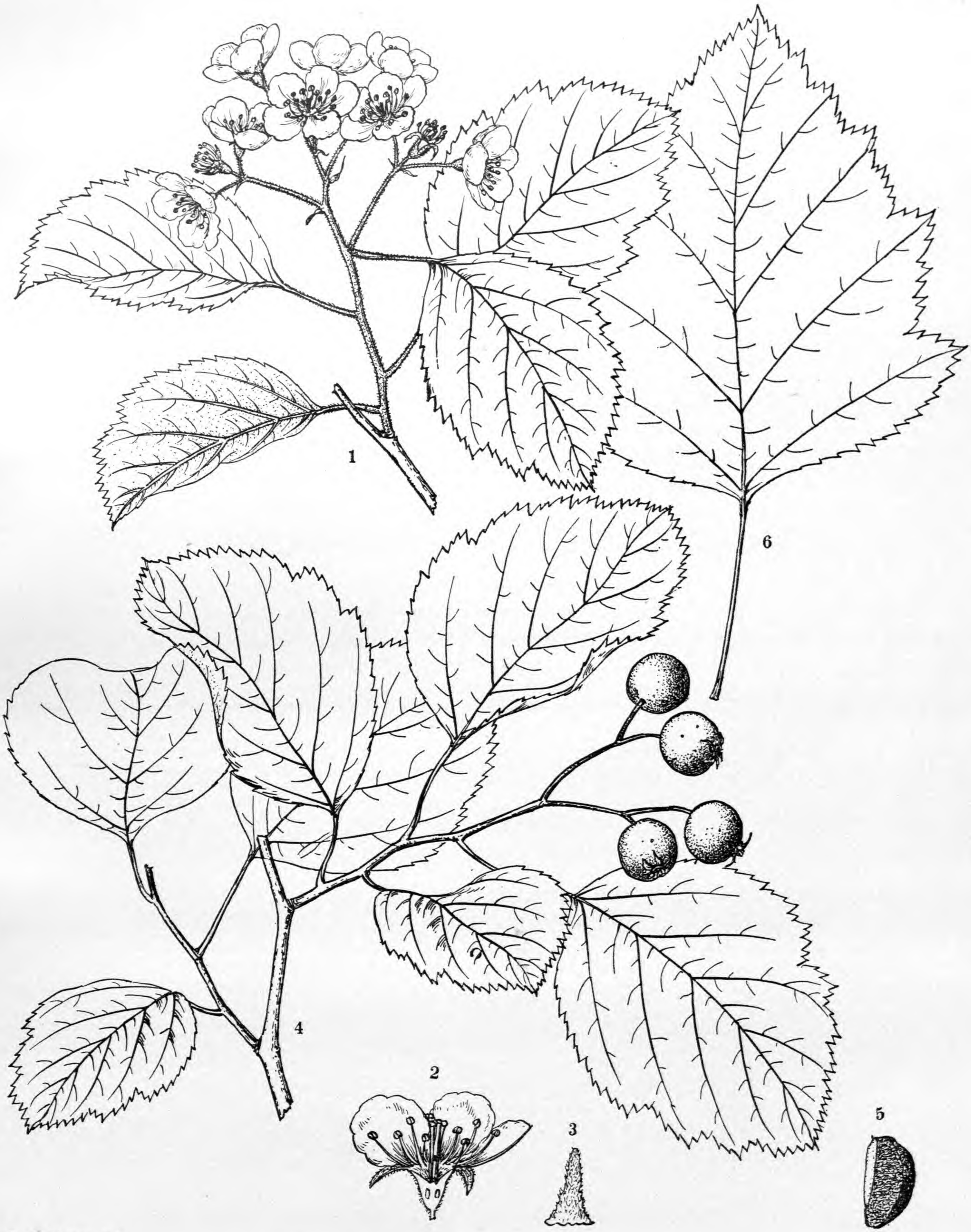
In dense woods on the rich bottom-lands of the Red River at Fulton, Hempstead County, Arkansas, *B. F. Bush*, March 26 and October 4, 1909 (Nos. 5418, 5927 [4 A] type), *B. F. Bush* and *C. S. Sargent*, March 26, 1909 (Nos. 4, 4 B), *B. F. Bush*, April 11, 1905, March 25, 1909 (Nos. 4 C, 4 D), April 11, 1905, March 25, 1909 (Nos. 4 E, 4 F); Texarkana, Arkansas, *B. F. Bush*, April 6, 1905 (No. 4), April 8, 1905 (No. 4 A); (all in herb. Arnold Arboretum).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLX. CRATÆGUS INVISA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. A nutlet, enlarged.
6. A leaf from a young vigorous shoot, natural size.



C. E. Faxon del.

CRATÆGUS INVISA, Sarg.

CRATÆGUS LIMARIA, SARG.

(Molles.)

CRATÆGUS LIMARIA, *n. sp.*

Leaves ovate, acute, concave-cuneate or rounded at the base, coarsely often doubly serrate, with straight broad glandular teeth, and slightly divided into three or four pairs of small acute lateral lobes; not more than one quarter grown when the flowers open early in April and then thin, yellow-green and covered above with short white hairs and thickly coated below with hoary tomentum, and at maturity thin, light green and scabrate on the upper surface, pale and tomentose on the lower surface, from 6 to 8 centimetres long and from 4 to 7 centimetres wide, with stout midribs and thin primary veins; petioles slender, slightly wing-margined at the apex, covered at first with long matted white hairs, villose through the season, from 2.5 to 3.5 centimetres in length; leaves on vigorous shoots broadly ovate, rounded or cordate at the wide base, more deeply lobed and often from 9 to 10 centimetres long and broad. Flowers from 2 to 2.2 centimetres in diameter, on long slender pedicels coated with matted white hairs, in compact fifteen- to twenty-flowered corymbs with conspicuous oblong-obovate acuminate glandular-serrate villose bracts and bractlets persistent until the flowers open, the lower peduncles from the axils of upper leaves; calyx-tube broadly obconic, thickly covered with white hairs, the lobes gradually narrowed from the base, wide, acuminate, laciniately glandular-serrate, villose, reflexed after anthesis; stamens twenty; anthers white; styles three to five, surrounded at the base by a narrow ring of pale tomentum. Fruit ripening in October, on long stout erect or spread-hairy pedicels, in few-fruited clusters, oval to ovate or short-oblong, rounded at the apex, truncate at the base, crimson, lustrous, marked by large pale dots, villose especially at the ends, from 1.2 to 1.5 centimetres in diameter; calyx prominent, with a long villose tube, a broad deep cavity tomentose in the bottom and erect villose persistent lobes dark red on the upper surface below the middle, their tips slightly spreading or incurved; flesh thick, yellow, dry and mealy; nutlets from 3 to 5, narrowed and rounded at the apex, rounded at the broad base, slightly grooved on the back, from 6.5 to 7 millimetres long and from 4 to 4.5 millimetres wide, the narrow hypostyle extending nearly to the base of the nutlet.

A tree, often 10 metres high, with a tall trunk from 2 to 3 decimetres in diameter, covered with dark scaly bark, stout ascending branches forming a narrow irregular head, and slender zigzag branchlets thickly coated when they first appear with long white hairs, light orange-brown, lustrous, pubescent, and marked by pale lenticels at the end of their first season, dull gray-brown and glabrous the following year, and armed with slender straight or slightly curved purple ultimately ashy gray spines from 5 to 6 centimetres long.

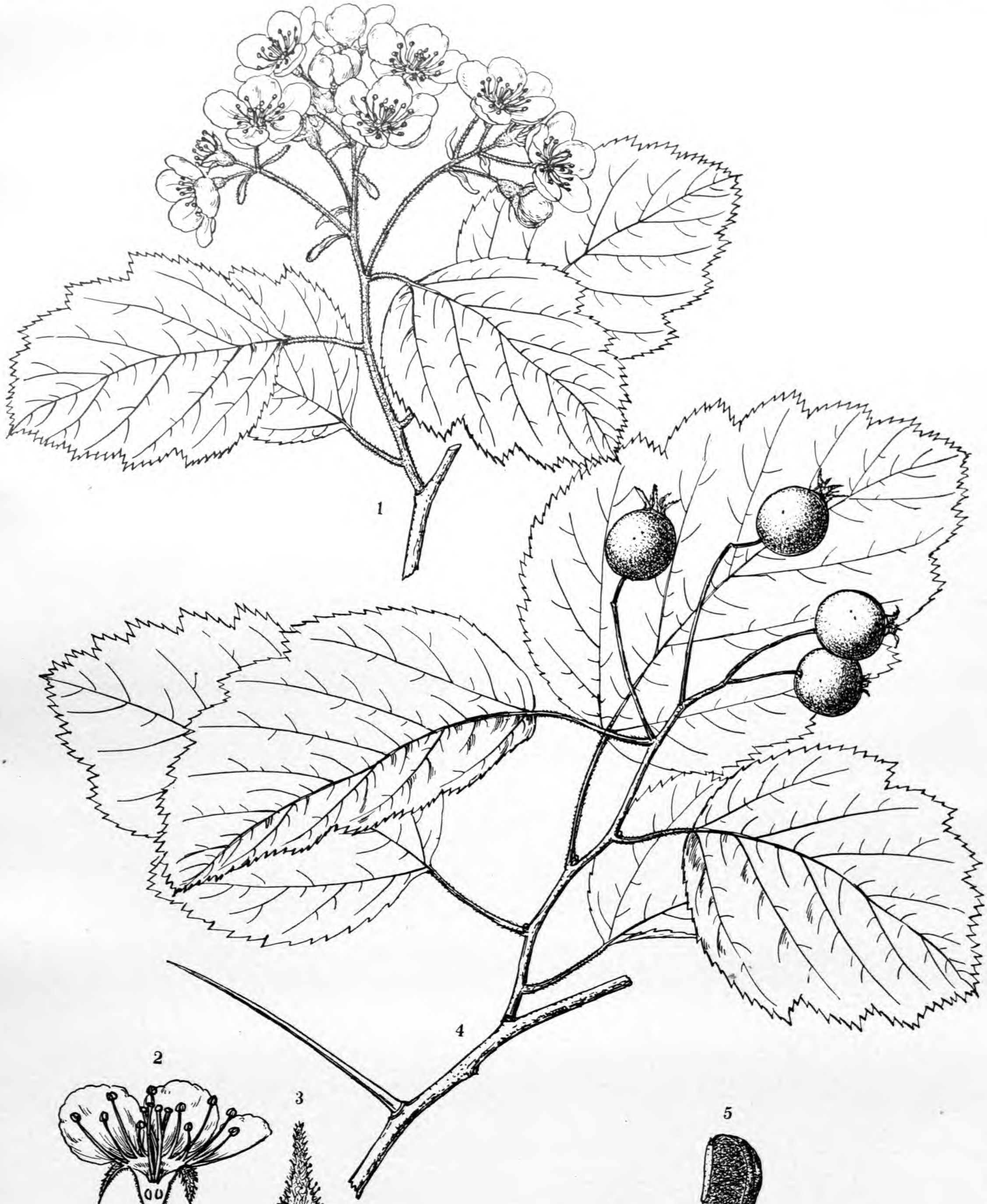
In dense woods on the rich bottom-lands of the Red River at Fulton, Hempstead County, Arkansas, *B. F. Bush*, April 5 and October 4, 1909 (No. 3 A type), April 5, 1909 (Nos. 3, 3 B, 3 C, 3 E, 3 F) (all in herb. Arnold Arboretum).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXI. CRATÆGUS LIMARIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. A nutlet, natural size.



C. E. Faxon del.

CRATÆGUS LIMARIA, Sarg.

PRUNUS RETICULATA, SARG.

PRUNUS (PRUNOPHORA) RETICULATA, *n. sp.*

Leaves oblong-ovate to slightly obovate or elliptical, gradually or abruptly narrowed and acuminate at the apex, rounded or cuneate and frequently slightly unsymmetrical at the entire base often furnished above the insertion of the petiole on each side with a small stipitate gland, and coarsely, often doubly serrate above, with broad, straight, or slightly incurved apiculate teeth; at maturity light yellow-green and roughened by short white hairs on the upper surface, lighter-colored and soft-pubescent on the lower surface, from 6 to 9 centimetres long and from 3 to 5.5 centimetres wide, with stout midribs and slender primary veins covered with long pale or rusty hairs, and numerous prominent reticulate veinlets deeply impressed on the upper side of the leaf; petioles stout, pubescent, glandular at the apex, with one or two collateral dark stipitate glands, or eglandular, about 1.5 centimetres in length. Flowers from 1.4 to 1.5 centimetres in diameter, fragrant, appearing before the leaves, on slender villose pedicels from 5 to 7 millimetres in length, in mostly three- to five-flowered umbels; calyx-tube narrowly obconic, coated below with long matted pale hairs and pubescent above the middle, the lobes entire, narrow and rounded or acute and occasionally slightly lobed at the apex, thickly coated with long pale matted hairs, reflexed after anthesis; petals white, nearly orbicular, gradually narrowed at the base; anthers yellow. Fruit on slightly hairy pedicels, subglobose, dull red, covered by a thick white bloom, from 1.8 to 2.2 centimetres in diameter, with a thick hard skin and thin bitter astringent flesh; stone suborbicular, compressed, rounded at the base, narrowed and rounded or acute and slightly ridged at the apex, thin and obscurely ridged on the dorsal edge, deeply or only slightly grooved on the thin ventral edge, from 1.3 to 1.5 centimetres long and nearly as broad.

A tree, from 10 to 12 metres high, with a tall trunk covered with dark scaly bark, large spreading and ascending branches forming an irregular head, and slender glabrous branchlets dull yellow-brown early in their first season, becoming bright chestnut-brown, very lustrous and marked by numerous small reticulate pale lenticels in their first winter, and dark gray-brown the following year; winter-buds acute, their scales acute, dark red, ciliate on the margins, 3 or 4 millimetres long; leaf-scars horizontal, prominent, pubescent on the rim, displaying three fibro-vascular bundle-scars, the central scar more prominent than the others. Flowers about the middle of March. Fruit ripens late in September and in October.

Grayson County, Texas, in the neighborhood of Denison, on uplands and near the borders of river bottoms, common. *T. V. Munson* and *C. S. Sargent*, March 25 and October 1, 1909, *T. V. Munson*, June 23, 1910 (No. 4, type), two miles west of Sherman, *T. V. Munson*, September, 1910 (all in herb. Arnold Arboretum).

This is one of several Texas tree plums which usually have been confounded with *Prunus americana*, Marshall. They differ from that species, however, in the shape of the stone of the fruit and in the fact that they do not produce suckers, which is one of the characteristics of *Prunus americana* and its allies. From other American plum trees *Prunus reticulata* differs in its thick leaves with conspicuous reticulate veinlets.

The first account of this tree appeared in Munson's *Forests and Forest Trees of Texas* issued in July, 1883, in Hough's *American Journal of Forestry*, p. 443, where it is doubtfully referred on the authority of Mr. Thomas Meehan to *Prunus umbellata*, Elliott, and where it is pointed out that it could not be, as had usually been supposed, *Prunus americana*, and that it did not agree with the published description of *Prunus umbellata*.

Further investigation is needed to determine the variation and distribution of this tree, which probably has a wide range in northern and central Texas.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXII. PRUNUS RETICULATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A stone, side view, natural size.
7. A stone, dorsal edge, natural size.
8. A winter branchlet, natural size.

C. E. Faxon del.

PRUNUS RETICULATA, Sarg.

PRUNUS TENUIFOLIA, SARG.

PRUNUS (PRUNOPHORA) TENUIFOLIA, *n. sp.*

Leaves oblong to oblong-obovate or elliptical, gradually narrowed and acute or acuminate and often abruptly long-pointed at the apex, cuneate or narrowed and rounded at the base, and finely often doubly serrate, with teeth pointing to the apex of the leaf; at maturity thin, dark yellow-green and sparingly covered above with short soft white hairs, paler and soft-pubescent below especially on the slender yellow midribs and seven or eight pairs of thin primary veins connected by occasional cross veinlets, from 8 to 10 centimetres long and from 3 to 5 centimetres wide; petioles slender, pubescent, becoming puberulous or nearly glabrous, glandular near the apex, with one to three prominent dark glands or eglandular. Flowers 2 centimetres in diameter, on slender pedicels furnished near the apex with a few long white hairs, and from 1 to 2 centimetres in length, in two- to four-flowered sessile umbels; calyx-tube narrowly obconic, glabrous with the exception of occasional long scattered white hairs near the base, their lobes narrow, entire or minutely dentate near the rounded apex, ciliate on the margins, pubescent on the outer surface, densely villose on the inner surface, reflexed after anthesis; petals white, ovate-oblong, narrowed and rounded at the apex, crenulate above the middle, gradually narrowed below into a short claw; anthers yellow. Fruit on stout slightly hairy or glabrous pedicels, oblong or oblong-obovate, red, covered with a thick glaucous bloom, from 1.5 to 1.8 centimetres long and from 1.2 to 1.4 centimetres in diameter, with a thick skin and thin flesh; stone oblong, compressed, pointed at the ends, slightly sulcate at the apex, unsymmetrical, ridged on the full and rounded dorsal edge, with a broad thin ridge, thin nearly straight and only slightly grooved on the ventral edge, from 1.5 to 1.7 centimetres long and about 1.2 centimetres wide.

A tree, often 10 metres high, with a tall trunk usually about 3 but occasionally as much as 4.5 decimetres in diameter, covered like the stout spreading branches with thick pale gray bark broken into long thick plate-like scales, and stout or slender glabrous branchlets light orange-green when they first appear, becoming light gray or reddish brown and lustrous at the end of their first season and dark dull reddish brown the following year. Flowers from the middle to the end of March. Fruit ripens in June.

Dry oak woods between Jacksonville and Larissa, Cherokee County, Texas, *C. S. Sargent*, March 24, 1910 (No. 2 type), *T. V. Munson*, May 18, 1910; Larissa, *C. S. Sargent*, March 24, 1910 (No. 6 with stout branchlets), *T. V. Munson*, May 18, 1910; in low ground and rich soil near Mt. Selma, Cherokee County, Texas, *T. V. Munson*, May 18, 1910.

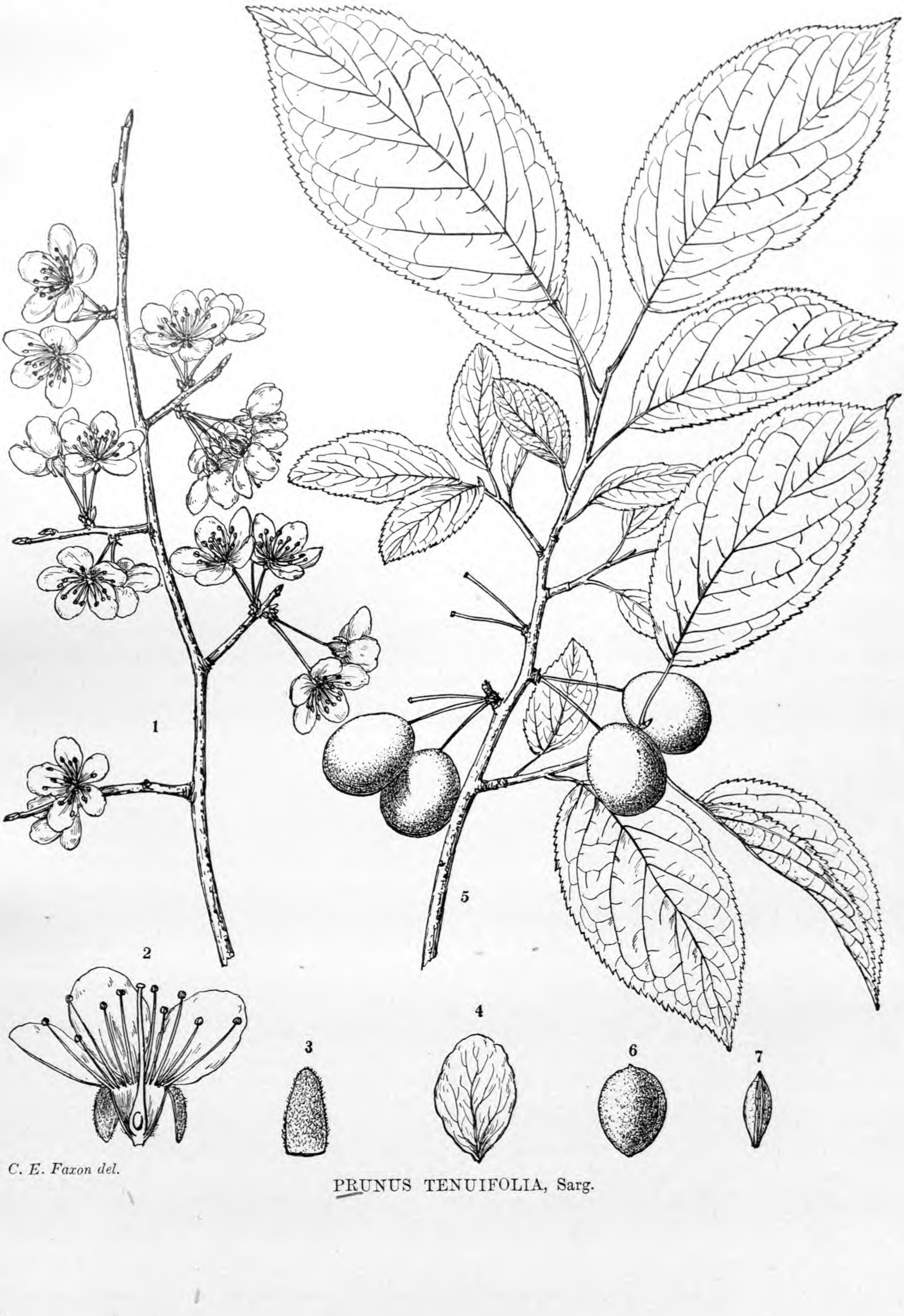
Prunus tenuifolia is well distinguished by the pale deeply furrowed bark of the trunk and young branches, by the thin leaves and by the occasional long hairs on the pedicels and at the base of the calyx-tubes. The oblong-obovate fruit and the thin flat stone differ in shape from those of the other Texas tree plums.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXIII. PRUNUS TENUIFOLIA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A stone, side view, natural size.
7. A stone, dorsal edge, natural size.



C. E. Faxon del.

PRUNUS TENUIFOLIA, Sarg.

PRUNUS POLYANDRA, SARG.

PRUNUS (PRUNOPHORA) POLYANDRA, *n. sp.*

Leaves oblong-elliptical or slightly obovate, gradually narrowed and acuminate or abruptly long-pointed at the apex, narrowed and rounded or occasionally cuneate at the base and coarsely doubly serrate, with straight glandular teeth; at maturity thin, dark green, smooth and glabrous on the upper surface, light yellow-green and coated below with pale pubescence most abundant on the slender midribs and thin primary veins connected by slender cross veinlets, from 1.8 to 2.2 centimetres long and from 4 to 4.5 centimetres wide; petioles slender, pubescent, glandular at the apex, with from one to three large stipitate glands, from 1.2 to 1.4 centimetres in length. Flowers from 2.2 to 2.3 centimetres in diameter, appearing before the leaves, on slender glabrous pedicels about 1 centimetre in length, in mostly three- to five-flowered sessile or short-peduculate umbels; calyx-tube narrowly obconic, glabrous, the lobes acute or acuminate and occasionally laciniately lobed near the apex, pubescent or glabrous on the outer surface, coated with pale tomentum on the inner surface, reflexed after anthesis; petals white, obovate, rounded at the apex, gradually narrowed below into a short claw; stamens as many as thirty-six, the longest one third longer than the elongated style; anthers yellow. Fruit on stout peduncles, subglobose, often slightly broader than high, bright red, lustrous, with a slight glaucous bloom, from 1.8 to 2 centimetres in diameter; stone obovate, pointed at the apex, gradually narrowed, acute at the base, more or less compressed, unsymmetrical, nearly straight and slightly grooved on the ventral edge, rounded and prominently ridged on the dorsal edge, from 1.2 to 1.5 centimetres long and from 8 to 10 millimetres wide.

A tree, from 7 to 10 metres high, with a tall trunk often 3 decimetres in diameter, covered with dark deeply furrowed scaly bark, stout branches forming an irregular head, and slender glabrous branchlets dull reddish brown and marked by pale lenticels in their first winter and dull gray-brown the following year. Flowers appear late in May. Fruit ripens about the first of July and does not entirely fall before the first of October.

Rich woods, Fulton, Hempstead County, common; *J. H. Kellogg*, March 27, June 31 and August 31, 1910 (Nos. 247 type, 241 with fewer stamens).

The specimens with young fruit collected at Fulton by B. F. Bush, April 25, 1901 (No. 184) and April 20, 1902 (No. 1387), are probably of this species, as is perhaps the specimen collected by him in Texarkana, Arkansas, April 8, 1905, also in young fruit (No. 2257). A specimen with leaves only, collected by Mr. Bush near Monteer, in Shannon County, Missouri, August 25, 1894 (No. 238), also probably belongs here, as do perhaps his numbers 1489 with young fruit and 4901 with leaves only from Monteer, and his No. 621 from Marshall, Texas, August 8, 1901, with leaves only (all in herb. Arnold Arboretum).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXIV. PRUNUS POLYANDRA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A stone, side view, natural size.
7. A stone, dorsal edge, enlarged.

C. E. Faxon del.

PRUNUS POLYANDRA, Sarg.

PRUNUS ARKANSANA, SARG.

PRUNUS (PRUNOPHORA) ARKANSANA, *n. sp.*

Leaves ovate to elliptical or obovate, abruptly long-pointed and acuminate at the apex, rounded or rarely cuneate and often glandular at the base, and finely doubly serrate, with slender apiculate straight or slightly incurved teeth; at maturity thick, dark yellow-green, glabrous and lustrous on the upper surface, paler and sparingly covered on the lower surface with long soft white hairs most abundant on the prominent midribs and primary veins and on the numerous conspicuous reticulate veinlets, from 4.5 to 9 centimetres long and from 3 to 4.5 centimetres wide; petioles stout, pubescent or puberulous, glandular at the apex, with large dark glands, or eglandular, from 1 to 1.5 centimetres in length. Flowers appearing before the leaves, 2.5 centimetres in diameter, on slender glabrous pedicels in three- or four-flowered sessile umbels; calyx-tube narrowly obconic, glabrous, the lobes short, rounded and lacerate at the apex, ciliate and sparingly glandular, with small sessile glands on the margins, puberulous on the outer surface, hoary-tomentose on the inner surface, reflexed after anthesis; petals white, ovate, rounded at the narrow apex, crenulate, gradually narrowed below into a short claw, about three times as long as the calyx-lobes; style longer than the stamens. Fruit short-oblong, rounded at the ends, dark purplish red with a slight glaucous bloom and thick succulent flesh, from 3 to 3.5 centimetres long and from 2.6 to 3 centimetres in length; stone oblong, much compressed, unsymmetrical, narrowed and rounded at the base, acute and often short-pointed at the apex, ridged on the rounded dorsal edge, with a broad thin ridge, thin, less rounded and grooved on the ventral edge, from 2.7 to 2.9 centimetres long and from 1.2 to 1.3 centimetres wide.

A tree, from 7 to 8 metres high, with a trunk sometimes 3 decimetres in diameter, stout branches forming an open irregular head, and slender glabrous branchlets light orange-brown, very lustrous and marked by dark lenticels during their first winter and dull gray-brown the following year. Winter-buds ovate, acute, glabrous, from 4 to 5 millimetres long. Flowers from the middle to the end of March. Fruit ripens at the end of June.

Rich woods, Prescott, Nevada County, Arkansas, *J. H. Kellogg*, March 23 and June 24, 1910 (Nos. 243 type and 244), Fulton, Hempstead County, Arkansas, *J. H. Kellogg*, March 21 and August 30, 1910 (No. 242, with later ripening fruit). Specimens collected by Kellogg at Prescott on March 26 and June 25, 1910 (No. 245), with more pubescent leaves, slightly villose pedicels, globose, bright red fruit not more than 2.5 centimetres in diameter and a less compressed stone, should perhaps be considered a form of this species.

Prunus arkansana seems to be well distinguished from the last species from the same region by its thicker more conspicuously reticulate leaves, the character of the pubescence on their lower surface, in the shape of the stone of the fruit and the color of the branchlets.[1]

C. S. S.

[1] The following shrubby species may be characterized: —

PRUNUS (PRUNOPHORA) VENULOSA, *n. sp.*

Leaves lanceolate, gradually or abruptly narrowed and acuminate at the apex, narrowed and rounded or cuneate at the base, and finely often doubly serrate, with slightly incurved or straight apiculate teeth; at maturity conspicuously reticulate-venulose, thin, dark yellow-green, smooth and lustrous on the upper surface, pale below, from 5 to 6 centimetres long and from 2 to 2.5 centimetres wide, with slender midribs and primary veins covered on their lower surface with short, white erect hairs; petioles slender, dark red, pubescent, glandular near the apex, from 1 to 1.2 centimetres in length. Flowers appearing before the leaves, from 6 to 7 millimetres in diameter, on slender sparingly villose pedicels from 4 to 5 millimetres long, in mostly three- or four-

flowered sessile umbels ; calyx broadly obconic, villose, the lobes narrowed and rounded at the apex, glandular and ciliate on the margins, villose on the outer surface, slightly hairy on the inner surface, spreading after anthesis ; petals nearly orbicular, rounded at the apex, narrowed below into a short slender claw ; anthers yellow. Fruit on slender glabrous pedicels, subglobose, sometimes slightly longer than broad, crimson covered with a glaucous bloom, about 1.5 centimetres in diameter, with thin hard skin, and thin acrid flesh ; stone oval to nearly orbicular, more or less flattened, narrowed and rounded at the base, short-pointed at the apex, nearly symmetrical on the two edges or sometimes fuller on the dorsal edge compressed into a wide thin ridge, rounded and only slightly grooved on the ventral suture, about 1 centimetre long and from 7 to 8 millimetres broad.

A shrub, from 1 to 2 metres high, with small, dark red-brown stems spreading into wide dense thickets, slender branchlets light red-brown and pubescent or puberulous in their first season and dull red-brown and glabrous the following year, and often furnished with short spreading spurlike lateral branchlets. Flowers the end of March. Fruit ripens about the middle of June.

Roadsides and fields near Denison, Grayson County, Texas, not common, *T. V. Munson*, March 13, May 22 and June 23, 1910, *T. V. Munson* and *C. S. Sargent*, March 20 and 21, 1910 (No. 2 type) (in herb. Arnold Arboretum).

This species and the next are known in Texas as Hog Plums on account of their bitter fruit, in distinction to the Chickasaw Plums, which produce edible fruits.

PRUNUS (PRUNOPHORA) REVERCHONII, *n. sp.*

Leaves lanceolate, gradually narrowed and long-acuminate at the apex, rounded and sometimes glandular at the base and finely often doubly crenulate-serrate, with apiculate teeth ; when they unfold slightly hairy above and coated below with long matted pale hairs, and at maturity thin yellow-green, glabrous with the exception of small axillary tufts of pubescence, from 4.5 to 8 centimetres long and from 2 to 2.5 centimetres wide, with slender midribs and primary veins connected by thin reticulate cross veinlets; petioles slender, pubescent when they first appear, soon becoming glabrous, glandular near the apex, from 1 to 1.4 centimetres in length; stipules linear, glandular-serrate, about 1 centimetre long, caducous. Flowers appearing with the leaves, about 1.2 centimetres in diameter, on slender glabrous pedicels from 6 to 8 millimetres in length, in sessile mostly three- or four-flowered umbels ; calyx-tube narrowly obconic, glabrous, the lobes narrow, acuminate, glandular on the margins, slightly pubescent on the outer surface, villose-pubescent on the inner surface, reflexed after anthesis; petals white, oblong-obovate, rounded at the apex, gradually narrowed below into a long claw ; stamens twenty to twenty-five, about as long as the style ; anthers yellow. Fruit on short pedicels, subglobose, from 1.5 to 1.8 centimetres in diameter, red or amber color, with a thick skin and thin acid flesh ; stone oval, more or less compressed, narrowed and rounded or pointed at the base, narrowed and usually abruptly short-pointed at the apex, nearly symmetrical on the two edges, broadly ridged on the dorsal edge, thin and barely grooved on the ventral edge, from 9 to 10 millimetres long and from 6 to 7 millimetres wide.

A shrub, sometimes 4 metres high, usually much smaller, with erect stems spreading into small thickets, and slender glabrous branchlets light orange-brown when they first appear, bright chestnut-brown and very lustrous and marked by small orbicular white lenticels during their first year, becoming dull reddish brown the following season, and occasionally furnished with short spinescent lateral branchlets. Flowers from the middle to the end of March. Fruit ripens in June and July.

Oklahoma: on the False Washita between Fort Cobb and Fort Arbuckle, *E. Palmer*, 1868 (in herb. Nat. Mus. teste *W. F. Wight*). Texas : on rich black soil near the borders of streams and swamps and on the prairies of northern and central Texas, common; Henrietta, Clay County, *T. V. Munson* and *C. S. Sargent*, March 21, *T. V. Munson*, May 25, *W. F. Wight*, August 9, 1910 (Nos. 1 and 2 type), *W. F. Wight*, August 8, 1910 (Nos. 4573, 4577, 4580) ; near Denison, Grayson County, *T. V. Munson*, May and June, 1910 (Nos. 6, 7, 11, 12, 15), *P. L. Ricker*, April 5, 1910 (No. 3374), *W. F. Wight*, August 6, 1910 (Nos. 4553, 4556, 4562); Dallas, Dallas County, "prairies and thickets," *J. Reverchon*, March and April, 1880 (No. 267), March, April and October, 1902 (Nos. 2990, 2991) ; Oak Cliff, near Dallas, Mrs. Matthews's yard, *T. V. Munson* and *C. S. Sargent*, March 23, *T. V. Munson*, June 1, 1910 (No. 1), *W. F. Wight*, August 4, 1910 (No. 4541) ; Mrs. Bennett's yard, *T. V. Munson* and *C. S. Sargent*, March 23, 1910 (No. 1 A), *W. F. Wight*, August 4, 1910 (No. 4540), near Dallas, *T. V. Munson* and *C. S. Sargent*, March 23, 1910 (Nos. 5, 8), *W. F. Wight*, August 1–4, 1910 (Nos. 4515, 4516, 4517, 4539) ; Waco, McLennan County, *P. L. Ricker*, April 1, 1910 (No. 3358), *W. F. Wight*, August 14, 1910 (No. 4590) ; Lomata, Lampasas County, *T. V. Munson*, March 11, 1910, *W. F. Wight*, August 13, 1910 (No. 4589) ; near Lampasas, *C. S. Mason*, March 15 and May 21, 1910 ; Kerrville, Kerr County, *B. Mackensen*, March 23, 1910 (No. 14), May 1, 1910 ; Boerne, Kendall County, *B. Mackensen*, May 15, 1910 (No. 12) ; near San Antonio, Bixar County, *S. H. Hastings*, May 7, 1910.

When its branches are covered by its crowded clusters of white flowers set off by the green of the young leaves, *Prunus Reverchonii* is a beautiful object, and it may be expected to become a valuable addition to the list of early garden shrubs.

I have associated the name of the late Julius Reverchon of Dallas, one of the most industrious and successful collectors of Texas plants, with this species, as his specimens collected near Dallas are the oldest which I have seen.

I take this opportunity to express my cordial thanks to Mr. W. F. Wight of the United States Department of Agriculture, who has carefully investigated several of the wild Plums of the United States with reference to their cultivated varieties, and who is engaged in the preparation of a monograph of Prunus, and to Mr. T. V. Munson, author of many important works on the grape and its cultivation, for the great help they have given me in this preliminary study of the Texas Plums.

PRUNUS GENICULATA, Harper, *Torreya*, ii. 64 (1911).

Leaves except on leading shoots fascicled on short spurlike lateral branchlets, elliptical, rounded or acute and apiculate at the apex, gradually narrowed and cuneate at the entire base furnished on one or on both sides with a large red gland, or occasionally eglandular, crenulate-serrate above the middle, with remote apiculate gland-tipped teeth, the glands soon deciduous ; at maturity thin, glabrous, light yellow-green and lustrous on the upper surface, pale on the lower surface, from 1.5 to 2 centimetres long and

from 8 to 12 millimetres wide, or on leading shoots sometimes 2.5 centimetres long and from 1 to 1.2 centimetres wide, with thin midribs and very obscure primary veins ; petioles slender, bright red, puberulous, from 4 to 5 millimetres in length ; stipules linear, glandular-serrate, scarious, caducous. Flowers from 1 to 1.2 centimetres in diameter, solitary, sessile on short lateral leafy branches covered with imbricated scales ; calyx-tube broadly obconic, glabrous, the lobes short, broad-ovate, ciliate on the margins, glabrous on the outer surface, puberulous on the inner surface, reflexed after anthesis ; petals pale pink, ovate to obovate, narrowed and rounded at the apex, contracted below into a short claw, undulate above the middle ; stamens about twenty, rather shorter than the style; anthers yellow ; ovary glabrous. Fruit short-oblong or slightly obovate, acute and abruptly short-pointed at the apex, rounded at the base, red, from 1.3 to 1.4 centimetres long and 1 centimetre in diameter, with a thick skin becoming conspicuously reticulate in drying and thin dry spongy flesh closely adherent to the stone ; stone oval in outline, nearly symmetrical on the two edges, only slightly flattened, thickened and ridged, with a broad low rounded slightly two-furrowed ridge on the dorsal edge, acute, without a groove on the ventral edge, from 1.1 to 1.2 centimetres long and about 1 centimetre wide, the endocarp thin, light orange-brown and very lustrous on the inner surface; seed filling the cavity of the stone, rounded and symmetrical at the base, acute and abruptly short-pointed at the apex ; testa thin, light chestnut-brown, striate, the raphe conspicuous ; chalaza small, depressed, dark-colored.

A low shrub, with small dark reddish brown stems and slender conspicuously zigzag branchlets light red and puberulous when they first appear, dark gray-brown the following year, and furnished with long slender horizontal lateral spinescent branchlets bearing numerous short leaf- and flower-producing spurlike branchlets.

Florida : Killarney, Orange County, *Otto Vesterlund*, March and May, 1889 (type for the flowers) (in herb. Gray) ; high sand hills south of Minneola, Lake County, common in pine woods, *R. M. Harper*, April 17, 1909 (No. 31 type for the fruit) (in herb. Arnold Arboretum and in herb. Gray).

Among the species of true Plums (Prunophora) this plant is peculiar in its solitary sessile flowers. Such flowers are not uncommon in Emplectocladus, but with its glabrous ovary and fruit *Prunus sessiliflora* cannot be united with that section of the genus, which with the other Amygdalæ is distinguished by its pubescent fruits.

PRUNUS TEXANA, Dietr.

This name should apparently be taken up for the small Texas shrubby Prunus which has usually been called *Prunus glandulosa*, Torrey & Gray, this name having been previously applied by Thunberg to a Japanese species which later was confounded with *Prunus japonica*, Thunberg. The synonymy of this Texas Plum thus becomes, —

PRUNUS TEXANA, Dietrich, *Syn. Pl.* iii. 45 (1843).

Amygdalus glandulosa, Hooker, *Icon.* iii. t. 288 (1840).

Prunus glandulosa (Hooker), Torrey & Gray, *Fl. N. Am.* i. 408 (not Thunberg) (1840).

Prunus Hookeri, C. K. Schneider, *Ill. Handb. Laubholzk.* i. 597 (1906).

EXPLANATION OF THE PLATE.

PLATE CLXV. PRUNUS ARKANSANA.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A stone, side view, natural size.
7. A stone, dorsal edge, natural size.

C. E. Faxon del.

PRUNUS ARKANSANA, Sarg.

PICRAMNIA, Sw.

(Simarubaceæ.)

PICRAMNIA, SWARTZ, *Prodr.* 27 (1783–88). — Schreber, *Gen.* 687. — Meissner, *Gen.* 75. — Endlicher, *Gen.* 1138. — Bentham & Hooker, *Gen.* i. 315. — Engler & Prantl, *Pflanzenfam.* iii. pt. iv. 228.

TARIRI, Aublet, *Hist. Pl. Guian.* Suppl. ii. 37 (1775).

BRASILIASTRUM, Lamarck, *Dict.* i. 462 (1783).

BRASILIUM, Gmelin, *Syst.* ii. 417 (1791).

Trees and shrubs, with bitter principles and slender terete branchlets. Leaves alternate, unequally pinnate, persistent, the leaflets subopposite to alternate, entire. Flowers dicœcious, occasionally perfect, small, glomerate on long pendulous spikes or racemes opposite the leaves; calyx three- to five-parted, the lobes imbricated in the bud, rarely wanting; stamens from three to five, opposite the petals, inserted under the lobed depressed disk, in the pistillate flower reduced to linear scales, or wanting; filaments naked; anthers two-celled, introrse, the cells opening longitudinally; ovary inserted on the disk, two- or three-celled, rudimentary in the staminate flower; style two- or three-lobed, the lobes recurved and stigmatic on the inner surface, or crowned by a two- or three-lobed sessile stigma; ovules two in each cell, collateral, attached at the inner angle of the cell near its apex, anatropous, raphe narrow; micropyle superior. Fruit baccate, oblong to oblong-obovate, two- or by abortion one-celled, the cells one-seeded; seeds filling the cavity of the cell, plano-convex, pendulous from the apex of the cell; hilum minute, apical, the raphe conspicuous; testa membranaceous, adherent to the exalbuminous undivided embryo; radicle superior, inconspicuous.

Picramnia, with about twenty species, is confined to the tropical and subtropical regions of the New World, one species extending into the southern part of Florida. The bitter principle in the plants of this genus makes the bark of several of them useful in domestic remedies.

The generic name, from πικρός and θάμνος, is in reference to this bitter principle.

C. S. S.

PICRAMNIA PENTANDRA, Sw.

PICRAMNIA PENTANDRA, Swartz, *Fl. Ind. Occ.* i. 220, t. 4 (1797). — De Candolle, *Prodr.* ii. 66. — A. Richard, *Ess. Fl. Ile Cub.* 379; *Fl. Cub.* i. 156. — Grisebach, *Fl. Brit. W. Ind.* 140. — Mazé, *Fl. Guadeloupe*, 29. — Duss, *Ann. Inst. Col. Marseille*, iii. 142 (*Fl. Phaner. Antill. Franç.*). — Chapman, *Fl.* ed. 3, 70. — Robinson, *Gray Syn. Fl. N. Am.* i. pt. i. 379. — Small, *Fl. Southeastern U. S.* 680. — Britton & Shafer, *N. Am. Trees*, 585, f. 540.

PICRAMNIA MICRANTHA, Tulasne, *Ann. Sci. Nat.* sér. 3, vii. 262 (1847).

Leaves from 2 to 3 decimetres in length, with slender rachises, five- to nine-foliate, the leaflets ovate-oblong, abruptly acuminate, gradually narrowed and cuneate at the base, coriaceous, glabrous, dark green, lustrous on the upper surface, petiolulate, from 2 to 2.5 centimetres long and from 1 to 1.5 centimetres wide, with thickened slightly revolute margins, prominent midribs, thin primary veins and slender reticulate veinlets; petioles stout, from 2 to 3 centimetres in length, that of the terminal leaflet slender and from 1 to 1.5 centimetres long. Flowers green, in slender pubescent racemes from 1.5 to 2 decimetres in length; calyx five-lobed, the lobes oblong-ovate, acuminate, coated on the outer surface with pale hairs; petals five, hirsute, acuminate, narrower and longer than the calyx-lobes; stamens five, wanting in the pistillate flower; filaments slender, glabrous, exserted; anthers short-oblong, obtuse; stigma sessile, two- or three-lobed. Fruit red, becoming nearly black when fully ripe, from 1 to 1.2 millimetres long and from 7 to 8 millimetres in diameter; seeds light brown and lustrous.

A shrub or slender tree, in Florida occasionally 6 or 7 millimetres high, with a straight trunk from 10.5 to 10.8 centimetres in diameter, covered with thin close yellowish brown bark, light yellow-green or pale brown branchlets slightly pubescent during their first season; or often a shrub.[1]

Florida: Dade County, Miami, between Bay Biscayne and the Everglades, *A. P. Garber*, 1877 (in herb. Gray), *A. H. Curtiss* (No. 441); Miami, *J. H. Simpson*, March, 1892; Everglades near Miami, *G. L. Fawcett*, September, 1908; Cocoanut Grove, *Miss O. Rodham*, May, 1910. Bahama Islands near Nassau, *A. H. Curtiss* (No. 49), January 25, 1903. Porto Rico, *A. A. Heller*, December, 1902 (No. 6264). Tobago, *Eggers*, October, 1889 (No. 5601). Colombia, *H. H. Smith*, May, 1898–1901 (No. 404) (all in herb. Arnold Arboretum).

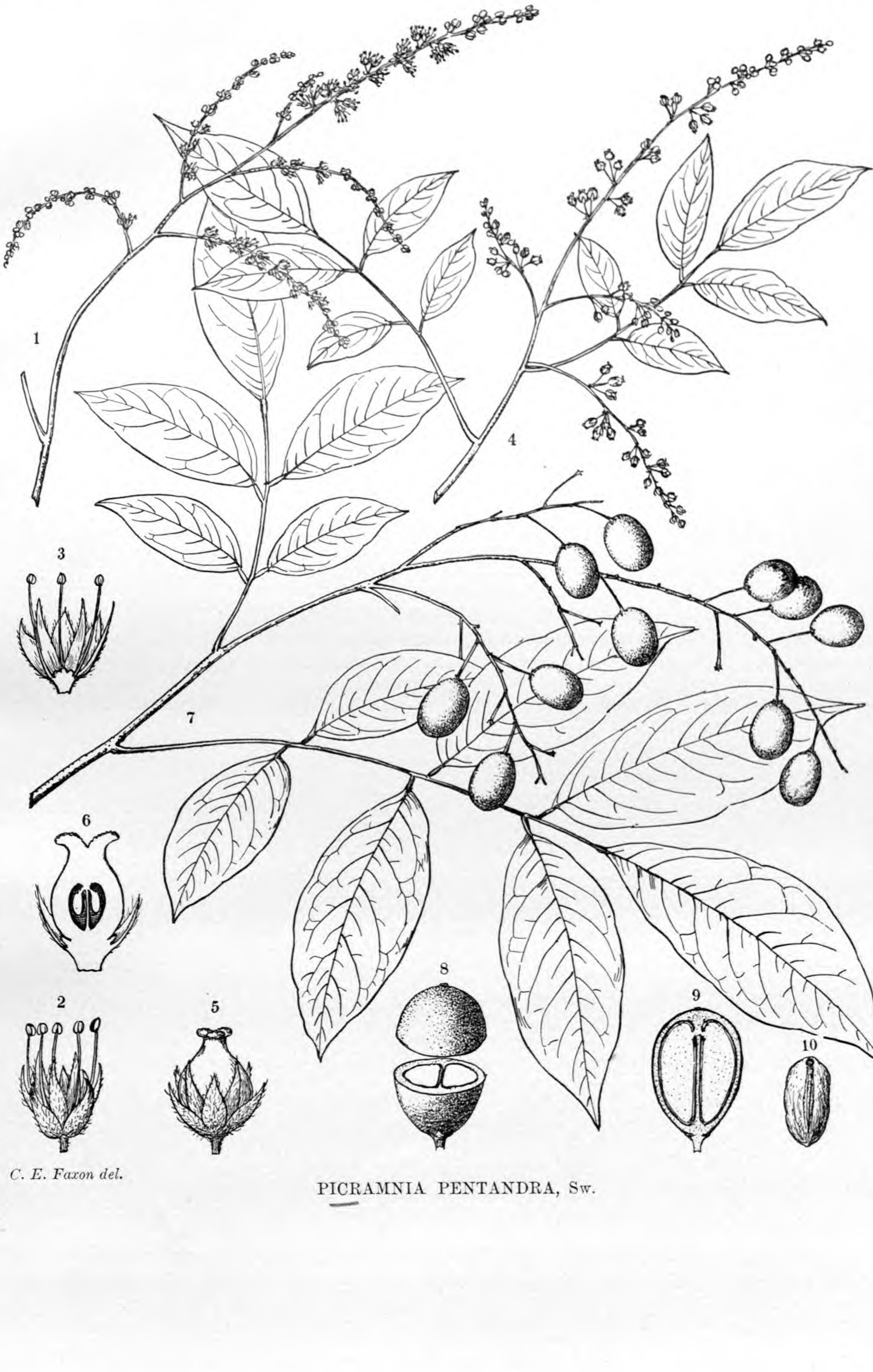
C. S. S.

[1] In the neighborhood of Miami Mr. G. L. Fawcett, scientific assistant in plant pathology, Department of Agriculture, has noticed two distinct forms of *Picramnia pentandra*, one with narrower darker green leaflets more attenuated at the ends, dark red or maroon fruit usually about 9 millimetres long, and light gray branches. On the other form the leaflets are broader and light green; the fruit is bright red, often 1.3 centimetres in length, and is borne on stouter pedicels, and the branches are light brown.

EXPLANATION OF THE PLATE.

PLATE CLXVI. PICRAMNIA PENTANDRA.

1. A staminate inflorescence, natural size.
2. A staminate flower, enlarged.
3. Vertical section of a staminate flower, enlarged.
4. A pistillate inflorescence, natural size.
5. A pistillate flower, enlarged.
6. Vertical section of a pistillate flower, enlarged.
7. A fruiting branch, natural size.
8. A fruit divided transversely, enlarged.
9. Vertical section of a fruit, enlarged.
10. A seed showing the raphe, enlarged.



C. E. Faxon del.

PICRAMNIA PENTANDRA, Sw.

ILEX KRUGIANA, LŒSEN.

ILEX KRUGIANA, Lœsener, *Engler Bot. Jahrb.* xv. 317 (1893). — A. R. Northrop, *Mem. Torrey Bot. Club*, xii. 48. — Britton & Shafer, *N. Am. Trees*, 627, f. 578.

Leaves ovate, ovate-elliptic or ovate-lanceolate, acuminate, and abruptly long-pointed or acute at the apex, rounded or obtusely cuneate at the base, entire, with slightly thickened margins, subcoriaceous or coriaceous, glabrous, dark yellow-green and lustrous above, dull beneath, persistent, from 6 to 10 centimetres long and from 2.5 to 3.5 centimetres wide, with prominent midribs deeply impressed on the upper side and pale on the lower side, and six to nine pairs of slender primary veins connected by thin reticulate veinlets; petioles slender, from 1 to 2 centimetres in length; stipules minute, whitish (on dried specimens) persistent. Flowers on slender pedicels from 3 to 6 millimetres long, in the axils of minute acute scarious deciduous bractlets, in crowded clusters, the staminate one- to three-flowered on short peduncles, the pistillate one-flowered; calyx from 1.5 to 2 millimetres in diameter, four-lobed, the lobes triangular, suberect, about as long as the tube, imbricated in the bud; corolla rotate, greenish white, from 2 to 2.5 millimetres in diameter; petals four, ovate or slightly obovate in the pistillate flower, imbricated in the bud; stamens four in the staminate flower, nearly as long as the petals; filaments slender, about as long as the oval introrse anthers attached on the back near the base and opening longitudinally; in the pistillate flower much smaller and abortive; ovary four-celled, ellipsoidal; stigma small, discoid, obscurely four-lobed; ovary of the staminate flower subconical, minute and abortive; ovule solitary, suspended, anatropous, raphe dorsal, micropyle superior. Fruit on stout pedicels from 3 to 10 millimetres long, drupaceous, globose, crowned by the remnants of the enlarged pale stigma, brownish purple, lustrous, from 4 to 5 millimetres in diameter; sarcocarp thin; nutlets four, irregularly three-seeded, obtusely angled, dark-brown, from 3 to 5 millimetres long and 1.5 millimetres broad.

In Florida, a tree, sometimes from 10 to 12 metres high, with a tall often crooked trunk occasionally 10 centimetres in diameter and covered with thin, smooth, nearly white bark, becoming on old individuals darker-colored and broken into narrow scales, and small ascending branches green when they first appear, becoming light gray and finally nearly white, and marked by numerous round elliptic lenticels; or often a shrub.

Florida: Dade County, Homestead, *A. R. Sargent*, March 20, 1908; Paradise Key, Everglades, *E. A. Bessey*, May 5, 1908 (No. 25); northern end of Paradise Key, Everglades, *R. M. Harper*, March 27, 1909 (all in herb. Arnold Arboretum). Bahama Islands near Nassau, *A. H. Curtiss*, March 23, 1903 (No. 132, in herb. Arnold Arboretum); Killarney Pine Barren, *Elizabeth G. Britton*, November 12–24, 1907 (No. 6546, in herb. U. S. Nat. Mus.); vicinity of Maidenhair Coppice, *P. Wilson*, January 4, 1909 (in herb. Mo. Bot. Gard.). Also in Hayti and San Domingo (*teste* Loiseleur).

In Florida *Ilex Krugiana* was discovered in May, 1904, by J. K. Small and Percy Wilson on Ross' Hammock, Dade County.[1]

The species is named in honor of C. W. L. Krug.[2] C. S. S.

[1] See Small, *Bull. N. Y. Bot. Gard.* iii. 430.

[2] Carl Wilhelm Leopold Krug (1833–98) was born in Berlin, and in 1857 engaged in business in Porto Rico, where later he became German and British Vice Consul. In Porto Rico he made large collections of plants, and bore the expenses of other collectors. After his return to Berlin in 1876 Krug became during the remainder of his life the associate of Urban in the study of the West Indian flora (see Urban, *Ber. Deutsch. Bot. Gesell.* xvi. *Gen.-Versamml.* 23; *Symb. Fl. Ind. Occ.* i. 90; iii. 69. — Schumann, *Verh. Bot. Ver. Brandenb.* xl. p. cvi.).

EXPLANATION OF THE PLATE.

PLATE CLXVII. ILEX KRUGIANA.

1. A flowering branch of the staminate plant, natural size.
2. A staminate flower, enlarged.
3. A staminate flower, the corolla displayed, enlarged.
4. A flowering branch of the pistillate plant, natural size.
5. A pistillate flower, enlarged.
6. Vertical section of a pistillate flower, enlarged.
7. A fruiting branch, natural size.
8. A fruit divided transversely, enlarged.

C. E. Faxon del.

ILEX KRUGIANA, Lœsen.

COLUBRINA ARBORESCENS (MILL.), SARG.

COLUBRINA ARBORESCENS (Miller), Sargent, *nov. comb.*

RHAMNUS COLUBRINUS, Jacquin, *Enum. Pl. Carib.* 16 (1760); *Hist. Stirp. Am.* 74; *Hist. Select. Stirp. Am.* 39, t. 74; *Hort. Vind.* iii. t. 50. — Linnæus, *Spec.* ed. 2, 280. — Willdenow, *Spec.* i. pt. ii. 1096. — Poiret, *Lamarck Dict.* iv. 468. — Rœmer & Schultes, *Spec.* v. 284. — Maycock, *Fl. Barb.* 112.

CEANOTHUS ARBORESCENS, Miller, *Dict.* ed. 8, No. 3 (1768).

CEANOTHUS COLUBRINUS (Jacquin), Lamarck, *Ill.* ii. 90 (1793). — De Candolle, *Prodr.* ii. 31. — Persoon, *Syn.* i. 244. — Macfadyen, *Fl. Jam.* i. 212 (excl. syn. *Ceanothus reclinatus*).

COLUBRINA FERRUGINOSA, Brongniart, *Mém. Fam. Rhamn.* 62, t. 4, f. 3 (1826); *Ann. Sci. Nat.* sér. 1, x. 369. — Grisebach, *Fl. Brit. W. Ind.* 100; *Cat. Pl. Cub.* 34. — Eggers, *Bull. U. S. Nat. Mus.* No. 13, 40 (*Fl. St. Croix and the Virgin Islands*). — Trelease, *Trans. St. Louis Acad. Sci.* v. 369; *Gray Syn. Fl. N. Am.* i. pt. i. 418. — Mazé, *Fl. Guadeloupe*, 19. — Hitchcock, *Rep. Mo. Bot. Gard.* iv. 71.

RHAMNUS FERRUGINOSA (Brongniart), Nuttall, *Jour. Acad. Nat. Sci. Phila.* vii. 90 (1834). — Torrey & Gray, *Fl. N. Am.* i. 263.

PERSONON (?) FERRUGINEUM, Rafinesque, *Sylva Tellur.* 29 (1838).

MARCORELLA COLUBRINA (Jacquin), Rafinesque, *Sylva Tellur.* 31 (1838).

COLUBRINA FERRUGINEA, A. Richard, *Ess. Fl. Ile Cub.* i. 358 (1845); *Fl. Cub.* ii. 146. — Coombs, *Trans. St. Louis Acad. Sci.* vii. 409.

COLUBRINA AMERICANA, Nuttall, *Sylva N. Am.* ii. 47, t. 58 (1846); Chapman, *Fl.* 74.

COLUBRINA COLUBRINA (Jacquin), Millspaugh, *Pub. Field Columb. Mus.* Bot. Ser. ii. 69 (1900). — Small, *Fl. Southeastern U. S.* 752; *Torreya*, xi. 13.

Leaves alternate, coriaceous, persistent, elliptical to ovate-lanceolate, gradually narrowed and blunt-pointed at the apex, narrowed and rounded or cuneate at the base, entire, dark green, glabrous and lustrous on the upper surface, below pale, coated with thick rusty pubescence, and sometimes marked by conspicuous glands mostly at the ends of small veins between the five or six pairs of more conspicuous primary veins, from 5 to 12 centimetres long and from 3 to 6 centimetres wide, with thick midribs; petioles stout, rusty-pubescent, from 1.5 to 2 centimetres in length; stipules oblong, acuminate, rusty-pubescent, caducous. Flowers perfect, minute, in axillary cymes shorter than the petioles, covered with persistent rusty pubescence and generally produced on short axillary branches; calyx-tube hemispherical, persistent under the fruit, five-lobed, the lobes triangular, ovate, conspicuously keeled on the outer surface, spreading, deciduous by a circumcissile line; petals five, inserted under the margin of the five-angled disk, white or nearly white, shorter than the calyx-tube, cucullate, unguiculate, infolding the stamens; stamens five, opposite and inserted with the petals; filaments slender, incurved; anthers ovate, attached on the back near the base, introrse, two-celled, the cells opening longitudinally; ovary subglose, glabrous, surrounded and confluent with the disk, three-celled, contracted into a slender three-lobed style, the lobes obtuse and stigmatic on their inner face; ovule solitary in each cell, erect from its base, anatropous, raphe ventral, micropyle inferior. Fruit on stout rusty-pubescent pedi-

cels from 5 to 6 millimetres long on much thickened peduncles, drupaceous, obovate to subglobose, dark purple or nearly black, from 6 to 7 millimetres in diameter, three-celled; exocarp thin, septicidally dehiscent into three one-seeded crustaceous light yellow nutlets two-valved at the apex; seeds erect, broadly obovate, compressed, three-angled, 5 millimetres long.

A tree, near Homestead, Dade County, Florida, sometimes from 7 to 8 metres high, with a straight trunk from 2 to 3 decimetres in diameter, large erect branches and stout branchlets densely rusty-pubescent when they first appear, and light gray, puberulous and marked by small dark lenticels in their second year; or often a shrub. Flowers produced irregularly in spring. Fruit ripens during the following winter and spring.[1]

Florida: Boca Chica Key, *A. H. Curtiss* (No. 473); Key Largo, *C. S. Sargent*, April 15, 1886; Flamingo, Munro County, *A. A. Eaton*, March 16, 1905; Homestead, Dade County, *A. R. Sargent*, March 30, 1908 (all in herb. Arnold Arboretum); also on several of the Antilles.

[1] The earliest account of this tree was published by Commelin in 1697 as *Arbor baccifera indica, foliis majoribus splendentibus, flore pentapetalo, Hort. Med. Amst.* i. 175, t. 90.

EXPLANATION OF THE PLATE.

PLATE CLXVIII. COLUBRINA ARBORESCENS.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a fruit, enlarged.
7. Vertical section of a fruit, enlarged.
8. A nutlet showing the seed, enlarged.
9. A seed, enlarged.
10. Vertical section of a seed, enlarged.

C. E. Faxon del.

COLUBRINA ARBORESCENS, Sarg.

TILIA LEPTOPHYLLA (VENT.), SM.

TILIA LEPTOPHYLLA (Ventenat), Small, *Fl. Southeastern U. S.* 762 (not Simonkai) (1903); Britton & Shafer, *N. Am. Trees*, 690, f. 642.

TILIA PUBESCENS, var. LEPTOPHYLLA, Ventenat, *Mém. Acad. Sci.* (*Paris*) iv. 11 (1799).

Leaves ovate, abruptly acuminate and long-pointed at the apex, truncate, unsymmetrical and more or less oblique or cordate and nearly symmetrical at the base, and coarsely serrate, with acuminate apiculate teeth; when they unfold covered above with scattered pale hairs and below with white tomentum, when the flowers open glabrous on the upper surface and more or less covered on the lower surface with clusters of floccose hairs sometimes early deciduous and sometimes persistent during the season, destitute of axillary hairs or occasionally furnished with small axillary clusters, and at maturity thin, dark yellow-green and lustrous on the upper surface, paler on the lower surface, from 8 to 15 centimetres long and from 6 to 12 centimetres wide, with thin prominent midribs and primary veins; petioles slender, glabrous, from 3 to 6 centimetres in length; stipules oblong to slightly obovate, acuminate, glabrous above, villose below. Flowers on floccose-pubescent pedicels from the axils of lanceolate pubescent bractlets deciduous before the flowers open, on slender peduncles sparingly villose in early spring, soon becoming glabrous, the free portion from 3.5 to 4 centimetres long, their bracts more or less obovate, rounded or acute at the apex, slightly pubescent and ciliate at first, soon becoming glabrous, from 7 to 10 centimetres in length, decurrent to the base or to within 5 or 6 millimetres of the base of the peduncle; sepals ovate, acuminate, hoary-tomentose on the outer surface, villose on the inner surface, about two thirds as long as the acuminate apiculate petals; petaloid scales emarginate. Fruit subglobose to short-oblong, hoary-tomentose, without angles, from 5 to 6 millimetres in diameter.

A tree, sometimes from 20 to 30 metres high, with a tall trunk from 1 to 1.5 metres in diameter and covered with pale gray furrowed bark, stout spreading and ascending branches forming a round-topped head, and slender light red-brown branchlets coated when they first appear with matted pale hairs, soon becoming glabrous.[1] Flowers in the first half of June. Fruit ripens in October.

Missouri: Noel, *B. F. Bush*, April 25, 1909 (No. 5530). Arkansas: Fulton, in the rich bottomlands of the Red River, *B. F. Bush*, April 11, 1905 (No. 2290), April 5, 1909 (No. 5464 A), April 28, 1909 (No. 5543), May 19, 1909 (No. 5647 B), June 6, 1909 (No. 5780 A), June 10, 1909 (Nos. 5814, 5815), October 4, 1909 (No. 5926), *C. S. Sargent*, March 27, 1909. Louisiana: Shreveport, *R. S. Cocks*, June, 1908 (No. 10), *D. Coty*, June, 1909; near Alexandria, *R. S. Cocks*, June, 1905; near Opelousas, *C. S. Sargent*, March 29, 1900; West Feliciana Parish, *R. S. Cocks*, June, 1907. Texas: Larissa, *B. F. Bush*, April 30, 1909 (No. 5571), October 7, 1909 (No. 5777) (all in herb. Arnold Arboretum).[2]

C. S. S.

[1] On a specimen collected at Larissa, Texas, by Mr. B. F. Bush, April 30, 1909 (No. 5571), the branch of the previous year is covered with short matted pale hairs, while the lateral branchlets of the year are glabrous. Other specimens from the same locality do not show this peculiarity. At Lake Charles, Louisiana, where the tree is common, there is a form with nearly glabrous leaves with teeth reduced to stout mucros (*Cocks & Sargent*, March, 1911).

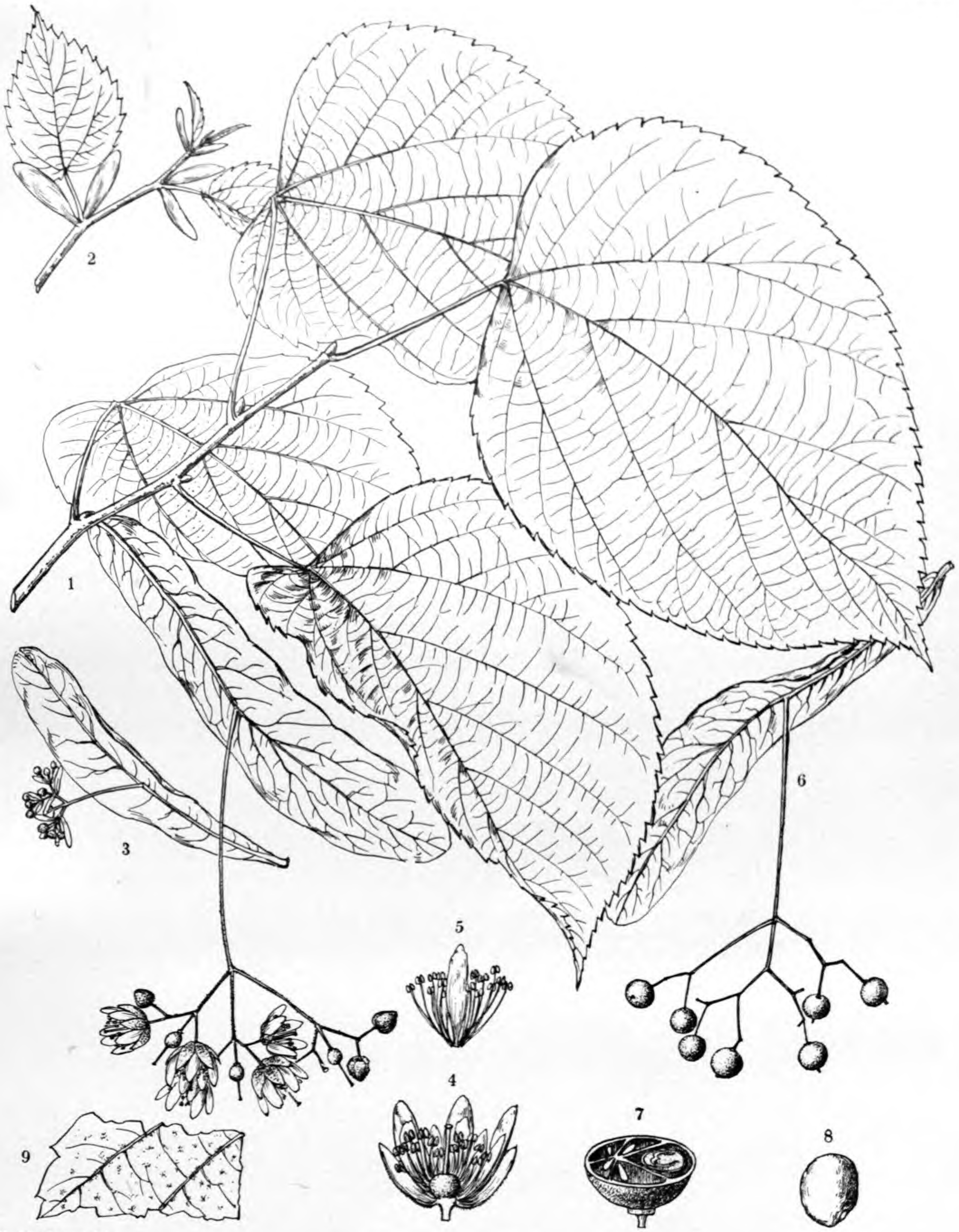
[2] Specimens without flowers or fruit collected by me on the rocky cliffs of the Savannah River at the Locks a few miles above Augusta, Georgia, are perhaps of this species.

Tilia leptophylla appears to be the only Linden in southern Arkansas, and it is probably the only species in Louisiana and eastern Texas with the exception of *Tilia pubescens*, Aiton, which is found in the immediate neighborhood of the coast from North Carolina to Texas, and which differs from *Tilia leptophylla* by the rusty tomentum of the leaves, fruit and branches, and by the smaller strap-shaped rarely slightly obovate bracts of the peduncles.

EXPLANATION OF THE PLATE.

PLATE CLXIX. TILIA LEPTOPHYLLA.

1. A flowering branch, natural size.
2. A branch with young leaves and stipules, natural size.
3. An inflorescence in bud, showing bractlets.
4. Vertical section of a flower, enlarged.
5. A petaloid scale, enlarged.
6. A cluster of fruit with its bract, natural size.
7. Cross section of a fruit, enlarged.
8. A seed, enlarged.
9. Part of a leaf showing the pubescence on the lower surface.



C. E. Faxon del.

TILIA LEPTOPHYLLA, Sm.

TETRAZYGIA.

(Melastomaceæ.)

TETRAZYGIA, A. Richard ex De Candolle, *Prodr.* iii. 172 (1828).—Meissner, *Gen.* 112.—Bentham & Hooker, *Gen.* i. 762.—Engler & Prantl, *Pflanzenfam.* iii. pt. vii. 187.
ANTHERYTA, Rafinesque, *Sylva Tellur.* 95 (1838).
LOMANTHERA, Rafinesque, *Sylva Tellur.* 96 (1838).
NAUDINIA, A. Richard, *Ess. Fl. Ile Cub.* 561 (1845).
HARRERA, Macfadyen, *Fl. Jam.* ii. 60 (1850).
CHITONIA, Don ex Naudin, *Ann. Sci. Nat.* sér. 3, xv. 339 (1851).
MICONIASTRUM, Naudin, *Ann. Sci. Nat.* sér. 3, xv. 341 (1851).

Trees or shrubs with watery juices and terete branchlets. Leaves opposite, petiolate, oblong-ovate to ovate-lanceolate, entire or denticulate, three- to five-nerved, persistent, furfuraceous like the young branchlets, panicles and calyx-tubes; stipules wanting. Flowers perfect in many-flowered terminal panicles or corymbs; calyx-tube urceolate or globose, adnate to the ovary, the limb constricted above the ovary and dilated below the apex, four- or five-lobed, the lobes short or elongated; petals four or five, inserted on the mouth of the calyx-tube, obovate, obtuse, convolute in the bud; stamens twice as many as the petals, equal, inserted in one series with the petals; filaments subulate; anthers linear-subulate, erect or slightly recurved, attached at the base, two-celled, opening by a minute pore at the apex, their connective not extended below the cells; ovary three- to six-celled; style filiform, curved, exserted, surrounded at the base by a short sheath eight- to ten-toothed at the apex; ovules indefinite, minute, anatropous, sessile on axile placentæ. Fruit a three- or four-celled berry, crowned by the persistent tube of the calyx; seeds numerous, minute, obpyramidal, thickened and incurved at the apex; testa coriaceous, slightly pitted; hilum basilar; embryo exalbuminous; cotyledons thick, radicle short, turned toward the hilum.

Tetrazygia, with fourteen species, is confined to the West Indies and to southern Florida where a single species has been discovered, the only tree of the great family of the Melastomaceæ found in the United States.

The generic name is from τέτρα and ζυγόν, in allusion to the often four-parted flowers.

TETRAZYGIA BICOLOR (MILL.), COGN.

TETRAZYGIA BICOLOR (Miller), Cogniaux, *De Candolle Monogr. Phaner.* vii. 724 (1891).— A. R. Northrop, *Mem. Torrey Bot. Club*, xii. 55.

MELASTOMA BICOLOR, Miller, *Dict.* ed. viii. No. 6 (1768).— Hitchcock, *Rep. Mo. Bot. Gard.* iv. 87.

NAUDINIA ARGYROPHYLLA, A. Richard, *Ess. Fl. Ile Cub.* 562 (1845); *Fl. Cub.* ii. 265, t. 44 bis.

MICONIASTRUM LAMBERTIANUM, Naudin, *Ann. Sci. Nat.* sér. 3, xv. 341 (in part) (1851); xvi. t. 25, f. 4.

TETRAZYGIA ANGUSTIFLORA, β ARGYROPHYLLA, Grisebach, *Fl. Brit. W. Ind.* 254 (1864); *Cat. Pl. Cub.* 98 (1866).

TETRAZYGIA ELÆAGNOIDES, Grisebach, *Fl. Brit. W. Ind.* 255 (in part) (1864); *Cat. Pl. Cub.* 98 (in part).

MICONIA BICOLOR (Miller), Triana, *Trans. Linn. Soc.* xxviii. 103 (1873).

Leaves oblong-lanceolate, acuminate, gradually narrowed and rounded at the base, three-nerved, entire, undulate and slightly thickened on the revolute margins, dark green on the upper surface, paler on the lower surface, from 8 to 12 centimetres long and from 2.5 to 4.5 centimetres broad, their petioles stout, from 2 to 2.5 centimetres in length. Flowers 2 centimetres in diameter, short-pediceled, in open cymose panicles; calyx urceolate, four- or five-lobed, the lobes nearly obsolete; petals four or five, oblong-obovate, reflexed after anthesis, white; ovary three-celled; style surrounded at the base by a short sheath ten-toothed at the apex.[1] Fruit oblong to ovate, conspicuously constricted at the apex, from 6 to 8 millimetres long and from 4 to 5 millimetres in diameter.

In Florida a shrub or in the dense woods of the keys of the Everglades a slender tree, often 10 metres high, with an erect trunk from 6 to 7 centimetres in diameter, covered with thin light gray-brown slightly fissured bark, small spreading branches becoming erect toward their apex, and gracefully drooping leaves; or in the sandy soil of open pine woods a shrub, often less than 1 metre in height. Flowers from March to May. Fruit ripens late in the autumn or in the early winter.[2]

Florida: Dade County, Homestead, *A. R. Sargent*, March, 1908, Long Key in the Everglades, *E. A. Bessey*, May, 1908, Paradise Key in the Everglades, *R. M. Harper* (No. 104), March, 1909. Bahama Islands: near Nassau, *A. H. Curtiss*, January and May, 1903 (No. 41) (all in herb. Arnold Arboretum). Cuba: *C. Wright* (Nos. 1222 and 1222 b) (in herb. Gray); Isla de Piños, *A. H. Curtiss*, April 5, 1904 (No. 414) (in herb. Arnold Arboretum).[3]

C. S. S.

[1] This peculiar sheath was noticed by A. Richard, who described and figured it as one of the characters of his genus Naudinia, suggesting that it might be an epigynous disk, but by later authors it has been overlooked. We are unable to find the long setæ ending the lobes of this sheath as figured by A. Richard.

[2] *Tetrazygia bicolor* appears to have been first noticed in Florida by Messrs. J. J. Carter and J. K. Small, who found it in the pine woods eight miles southwest of Cutler, Dade County, in November, 1903. Later it was found by the botanists of the New York Botanic Garden near Camp Longview and on Long Key in the Everglades (see Small, *Bull. N. Y. Bot. Gard.* iii. 431).

[3] According to Triana (*Trans. Linn. Soc.* xxviii. 103), *Melastoma foliis lanceolatis: nervis tribus longitudinalibus: subtus glabris coloratis*, Linnæus, *Hort. Cliff.* 162, is the first description of this species.

EXPLANATION OF THE PLATE.

PLATE CLXX. TETRAZYGIA BICOLOR.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A stamen, enlarged.
4. Base of the style, showing the dentate sheath.
5. A fruiting branch, natural size, collected on the Bahamas by Curtiss.
6. A fruit divided transversely, enlarged.
7. A seed, enlarged.
8. A seed, side view, enlarged.

C. E. Faxon del.

TETRAZYGIA BICOLOR, Cogn.

CALYPTRANTHES ZUZYGIUM (L.), Sw.

CALYPTRANTHES ZUZYGIUM (Linnæus), Swartz, *Prodr.* 79 (1788); *Fl. Ind. Occ.* ii. 919. — Willdenow, *Spec.* ii. pt. ii. 974. — Lunan, *Hort. Jam.* i. 62. — Persoon, *Syn.* ii. 31. — Sprengel, *Syst.* ii. 500. — De Candolle, *Prodr.* iii. 257. — A. Richard, *Ess. Fl. Ile Cub.* 578; *Fl. Cub.* ii. 275. — Macfadyen, *Fl. Jam.* ii. 111. — Grisebach, *Fl. Brit. W. Ind.* 232; *Cat. Pl. Cub.* 85. — Sauvalle, *Fl. Cub.* 39. — Mazé, *Fl. Guadeloupe*, 46.

MYRTUS ZUZYGIUM, Linnæus, *Amæn.* v. 398 (1760); *Syst.* ed. 10, 1056; *Spec.* ed. 2, 675. — Swartz, *Obs. Bot.* 202.

CALYPTRANTHES CHYTRACULIA, ϵ ZUZYGIUM, Berg, *Linnæa*, xxvii. 28 (1854).

Glabrous. Leaves persistent, elliptical, abruptly or gradually narrowed at the apex into a blunt point, or acute, cuneate at the base, entire, covered with minute pellucid dots, dark yellow-green and lustrous on the upper surface, paler on the lower surface, from 4 to 5.5 centimetres long, from 1.5 to 3 centimetres wide, with broad low midribs and slender primary veins arcuate and connected within the slightly revolute somewhat undulate margins; petioles deeply grooved, from 3 to 4 millimetres in length; stipules wanting. Flowers perfect, on slender pedicels, from 4 to 5 millimetres long, in axillary one- to three-branched cymes, on slender peduncles from 2.5 to 3 centimetres in length, the ultimate divisions of the inflorescence one- to three-flowered; calyx-tube turbinate, produced above the ovary, enclosed in the bud by a lid-like orbicular limb opening in æstivation by a circumcissile line, the limb at first attached laterally, finally becoming deciduous; disk lining the tube of the calyx; petals wanting; stamens numerous, inserted in many ranks on the margin of the disk; filaments slender, inflexed in the bud, exserted; anthers ovate, two-celled, the cells opening longitudinally; style simple, filiform, rather longer than the stamens; stigma terminal, minute; ovules two or three in each cell, attached to a central placenta, ascending, anatropous, raphe ventral, the micropyle superior. Fruit baccate, crowned by the persistent calyx-tube, from 8 to 9 millimetres in diameter; seed subglobose; cotyledons foliaceous, conduplicate, radicle elongated, incurved.

In Florida a tree, sometimes 12 metres high, with a tall trunk from 7 to 8 centimetres in diameter, covered with smooth pale gray bark, small branches, and slender terete ascending ashy gray branchlets. Flowers in early summer. Fruit ripens in the autumn.[1]

Florida: Dade County, Paradise Key in the Everglades, *E. A. Bessey*, May 5, 1908 (No. 28); Long Key in the Everglades, *E. A. Bessey*, May, 1908 (No. 52) (in herb. Arnold Arboretum). Bahama Islands: New Providence, Waterloo, *N. L. Britton* and *L. J. K. Brace*, September 13, 1904 (No. 742 in herb. Gray). Cuba: *C. Wright*, 1860–64 (No. 2413 in herb. Gray). Jamaica: *W. Harris* (Nos. 5073, 5075, 8550, in herb. Arnold Arboretum); *E. Campbell* (No. 5735, in herb. Nat. Mus.). Also in Hayti (*teste* Grisebach) and Guadeloupe.

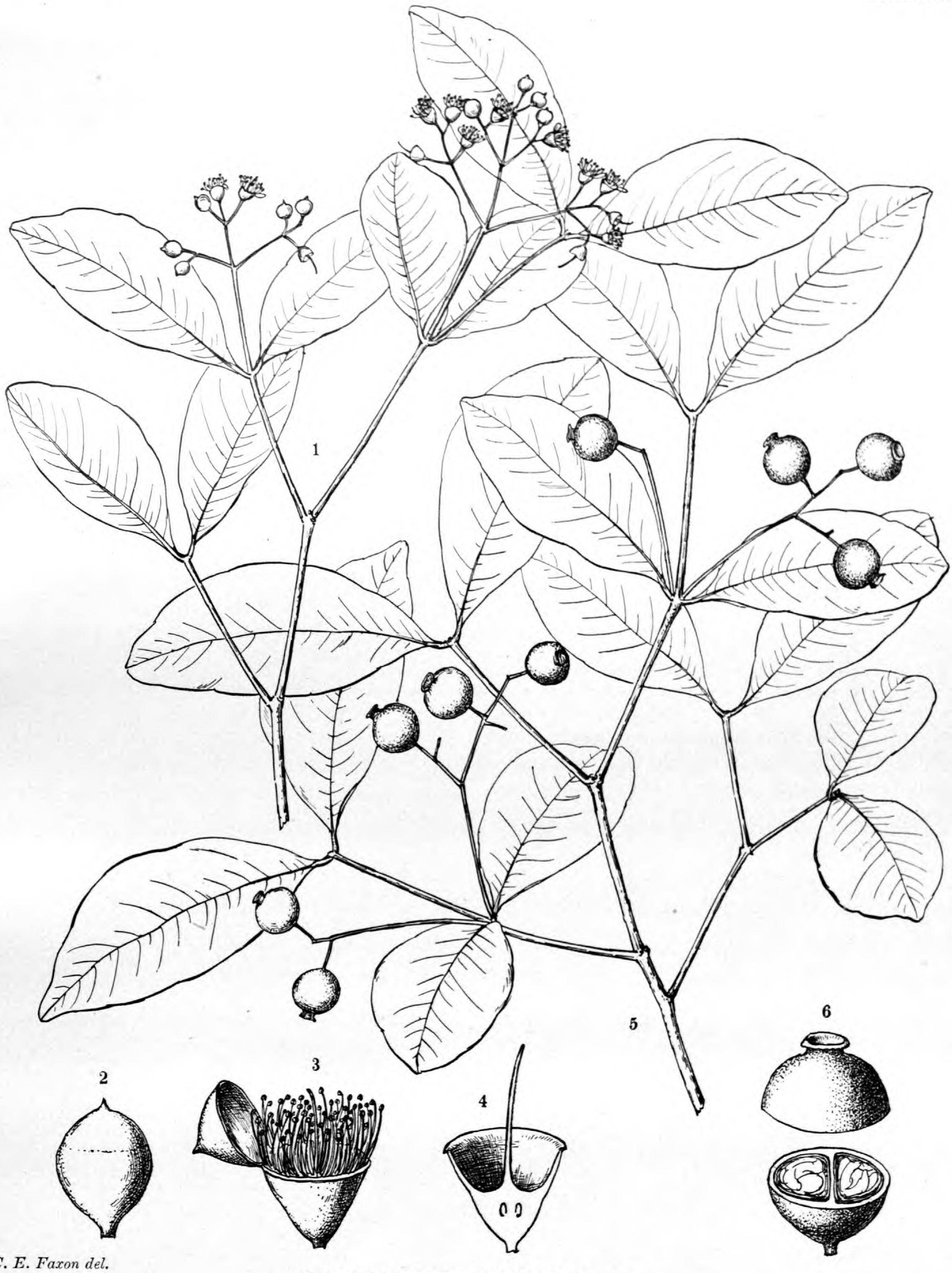
C. S. S.

[1] I have adopted the specific name used first by Linnæus, although recent writers have usually changed it to Suzygium. The only figure of this plant which has been published previously appeared in 1756 in Patrick Browne's *Flora of Jamaica*, where it was first described as *Suzygium fruticosum, foliis ovatis nitidis & ramulis ubique jugatis*, 240, t. 7. f. 2.

EXPLANATION OF THE PLATE.

PLATE CLXXI. CALYPTRANTHES ZUZYGIUM.

1. A flowering branch, natural size (from a specimen in herb. Mo. Bot. Gard., collected in the Bahamas by P. Wilson).
2. A flower-bud, enlarged.
3. A flower, enlarged.
4. Vertical section of a flower, enlarged.
5. A fruiting branch, natural size (from a specimen in herb. Gray, collected in the Bahamas by N. L. Britton and L. J. K. Brace).
6. A fruit divided transversely, enlarged.



C. E. Faxon del.

CALYPTRANTHES ZUZYGIUM, Sw.

RAPANEA, AUBL.

(Myrsinaceæ.)

RAPANEA, Aublet, *Hist. Pl. Guian.* i. 121 (1775). — A. L. de Jussieu, *Gen.* 288. — Mez, *Urban Symb. Fl. Antill.* ii. 427 ; Engler, *Pflanzenreich*, Heft 9 (iv. 236), 342.

MANGLILLA, A. L. de Jussieu, *Gen.* 151 (1789).

ATHRUPHYLLUM, Loureiro, *Fl. Cochin.* i. 120 (1790).

CABALLERIA, Ruiz & Pavon, *Prodr.* 141 (1794).

ROEMERIA, Thunberg, *Nov. Gen.* ix. 130 (1798) ; Roemer, *Archiv. Bot.* ii. 1.

SCLEROXYLUM, Willdenow, *Berl. Mag.* iii. 57 (1809).

MYRSINE, R. Brown, *Prodr.* i. 533 (in part, not Linnæus) (1810). — A. de Candolle, *Ann. Sci. Nat.* sér. 2, ii. 292 (in part) ; xvi. 78 (in part) ; *Trans. Linn. Soc.* xvii. 104 (in part). — Miquel, *Martius Fl. Brasil.* x. 306 (in part). — Bentham & Hooker, *Gen.* ii. 642 (in part). — Pax, *Engler & Prantl Pflanzenfam.* iv, pt. i. 92 (in part). — Baillon, *Hist. Pl.* xi. 333 (in part).

SUTTONIA, A. Richard, *Bot. Voy. Astrol.* 349 (1832).

FIALARIS, Rafinesque, *Sylva Tellur.* 166 (1838).

HEURLINIA, Rafinesque, *Sylva Tellur.* 166 (1838).

Trees or shrubs, with watery juices and terete branchlets. Leaves alternate, entire or rarely dentate, usually distinctly lepidote, persistent, exstipulate. Flowers perfect or unisexual by abortion, minute, four- or five- or rarely six- or seven-merous, sessile or pedicellate, in small axillary sessile or pedunculate fascicles, their bracts deciduous ; calyx inferior, free, persistent, the sepals imbricate-valvate in the bud, ciliate, usually glandular-punctate ; corolla hypogynous, the lobes more or less connate at the base, ovate or elliptical, spreading or recurved, glandular-punctate, papillose on the margins, imbricate or rarely convolute in the bud ; stamens inserted on the base of the corolla, opposite its lobes ; filaments wanting ; anthers short, connate to the corolla, acuminate and papillose at the apex, introrse, two-celled, the cells opening longitudinally ; ovary globose or ellipsoidal, one-celled ; stigma capitate, irregularly lobed ; ovules few, peltate, immersed in one series near the middle of the free fleshy globose placenta, amphitropous. Fruit drupaceous, pea-shaped, dry or fleshy, one-seeded. Seed filling the cavity of the fruit, globose, intruded at the base ; testa thin ; albumen copious, corneous, rarely slightly ruminate ; embryo cylindrical, elongated, transverse, usually curved ; cotyledons small, radicle elongated.

Of Rapanea, chiefly distinguished by Metz from Myrsine by its sessile or nearly sessile anthers and by its usually nearly sessile stigmas, one hundred and forty species are recognized.[1] These are widely distributed through the tropical and semitropical regions of the two hemispheres, one species reaching southern Florida from the south.

The generic name is from the native name of *Rapanea guianensis* in French Guiana.

C. S. S.

[1] The fact that in one of the forms of the staminate flowers of *Rapanea guianensis* as it grows in Florida the ovary is narrowed into a distinct style terminating in an oblique stigma appears to have been overlooked. In the pistillate flowers of this species there is a short style hidden by the lobes of the large stigma. The sessile or nearly sessile stigma cannot therefore be relied upon always to separate Rapanea from Myrsine.

RAPANEA GUIANENSIS, AUBL.

RAPANEA GUIANENSIS, Aublet, *Hist. Pl. Guian.* i. 121, t. 46 (1775). — Lamarck, *Ill.* ii. 48, t. 122, f. 1. — Poiret, *Lamarck Dict.* vi. 67. — Mez, *Urban Symb. Fl. Antill.* ii. 431; *Engler Pflanzenreich*, Heft 9 (iv. 236), 392. — Small, *Fl. Southeastern U. S.* 907. — Britton & Shafer, *N. Am. Trees*, 767.

SAMARA PENTANDRA, Swartz, *Obs. Bot.* 51 (not Aiton) (1791).

SIDEROXYLON PUNCTATUM, Lamarck, *Ill.* ii. 42 (1793). — Poiret, *Lamarck Dict.* Suppl. i. 446.

SAMARA FLORIBUNDA, Willdenow, *Spec.* i. 665 (1797).

MYRSINE FLORIBUNDA, R. Brown, *Prodr.* 533 (1810). — Grisebach, *Fl. Brit. W. Ind.* 393; *Cat. Pl. Cub.* 162. — Duss, *Ann. Inst. Col. Marseille*, iii. 382 (*Fl. Phaner. Antill. Franç.*). — Stahl, *Estud. Fl. Puerto Rico*, vi. 36.

CABALLERIA CORIACEA, G. F. W. Meyer, *Prim. Fl. Esseq.* 118 (1818).

BUMELIA ? PUNCTATA, Rœmer & Schultes, *Syst.* iv. 498 (1819).

MYRSINE RAPANEA, Rœmer & Schultes, *Syst.* iv. 509 (1819). — A. De Candolle, *Ann. Sci. Nat.* sér. 2, ii. 293; *Trans. Linn. Soc.* xvii. 107; *Prodr.* viii. 97. — Miquel, *Martius Fl. Brasil.* x. 307, t. 50, 51. — Gray, *Syn. Fl. N. Am.* ii. pt. i. 65. — Chapman, *Fl.* ed. 3, 296.

MYRSINE FLORIDANA, A. De Candolle, *Trans. Linn. Soc.* xvii. 107 (1834); *Prodr.* viii. 98. — Chapman, *Fl.* 277.

MYRSINE CORIACEA, A. De Candolle, *Trans. Linn. Soc.* xvii. 107 (not R. Brown) (1834). — Grisebach, *Fl. Brit. W. Ind.* 392.

MYRSINE CUBANA, A. De Candolle, *Ann. Sci. Nat.* sér. 2, xvi. 86 (1841); *Prodr.* viii. 98. — A. Richard, *Fl. Cub.* iii. 77.

MYRSINE GAUDICHAUDII, A. De Candolle, *Ann. Sci. Nat.* sér. 2, xvi. 85 (1841); *Prodr.* viii. 96.

MYRSINE BACCATA, A. De Candolle, *Ann. Sci. Nat.* sér. 2, xvi. 86 (1841); *Prodr.* viii. 99.

MYRSINE MONTICOLA, Martius, *Flora*, xxiv. ii. Beibl. 18 (1841).

MYRSINE RAPANEA, f. UMBROSA, Miquel, *Martius Fl. Brasil.* x. 308 (1856).

MYRSINE UMBELLATA, β MAJOR, Miquel, *Martius Fl. Brasil.* x. 311 (1856).

MYRSINE UMBELLATA, δ MONTICOLA, Miquel, *Martius Fl. Brasil.* x. 311, t. 55, f. 2 (1856).

MYRSINE GUIANENSIS (Aublet), O. Kuntze, *Rev. Gen.* ii. 402 (1891).

Leaves crowded at the ends of the branches, oblong-obovate, obtuse or retuse at the apex, gradually narrowed and contracted at the base, coriaceous, bright green and lustrous on the upper surface, paler on the lower surface, from 7 to 10 centimetres long and from 2.5 to 4 centimetres wide, with thickened revolute margins, thick midribs and obscure veins; petioles stout, narrowly wing-margined, from 6 to 8 millimetres in length. Flowers usually five- rarely four-merous, trimorphous, white, more or less marked with purple, about 4 millimetres in diameter; calyx divided to the middle, the lobes broadly ovate, acute or rounded at the apex, slightly ciliate, persistent under the fruit; corolla two or three times longer than the calyx, five-lobed, the lobes spreading, narrowed and rounded at the apex, slightly ciliate on the margins. Staminate flowers dimorphous; anthers sagitate-apiculate, inserted below the middle of the petals; ovary in one

form crowned by a minute discoid sessile stigma and probably abortive; in the other form, gradually narrowed into a slender style terminating in an oblique stigma and fertile; pistillate flowers, anthers smaller and rudimentary, the ovary crowned by a large nearly sessile irregularly lobed papillose stigma deciduous from the fruit. Fruit clusters crowded on the elongated somewhat thickened spurlike peduncles covered with imbricated persistent bracts, dark blue or nearly black, crowned by the persistent style, from 4 to 5 millimetres in diameter; exocarp thin, fleshy; endocarp crustaceous, white; seed light chestnut-brown and lustrous; albumen ruminate.

A tree, in Florida occasionally from 6 to 7 metres high, with a tall usually more or less crooked trunk from 1.6 to 2 centimetres in diameter, covered with thin close pale gray bark, small ascending branches forming an open irregular head, and slender gray or light red-brown branchlets roughened for a year or two by the persistent spur-like peduncles of the fallen fruit and later marked by their circular scars in the axils of the small transverse leaf-scars; or more often shrubby in habit. Wood hard, strong, close-grained, pale yellow-brown.

Florida: shores of Indian River on the east coast and Palmetto, Manatee County, on the west coast (*G. V. Nash*, No. 2440), southward to the southern keys, common. On the Bahamas and through the West Indian Islands to southern Brazil,[1] and to Mexico and Bolivia.

C. S. S.

[1] Judging by the figure of the pistillate flower with its deeply lobed stigma and of the staminate flower of one form only in Martius's *Fl. Brasil.* x. t. 50 & 51, it is possible that these plates may represent another species.

EXPLANATION OF THE PLATE.

PLATE CLXXII. RAPANEA GUIANENSIS.

1. A branch with staminate flowers, natural size.
2. A flower with fertile anthers and sessile discoid stigma, enlarged.
3. The same flower with the corolla laid open, enlarged.
4. An anther of the same flower, rear view, enlarged.
5. Vertical section of a pistil of the same flower, enlarged.
6. A flower with abortive anthers and elongated style, enlarged.
7. A branch with pistillate flowers, natural size.
8. A pistillate flower, enlarged.
9. A vertical section of a pistil of the same flower, enlarged.
10. A placenta of the same flower, enlarged.
11. A fruiting branch, natural size.
12. Vertical section of a fruit, enlarged.

C. E. Faxon del.

RAPANEA GUIANENSIS, Aubl.

GUETTARDA SCABRA (L.), LAM.

GUETTARDA SCABRA (Linnæus), Lamarck, *Ill.* ii. 218, t. 154, f. 3 (1793). — Ventenat, *Choix*, 1, t. 1. — De Candolle, *Prodr.* iv. 456. — Grisebach, *Fl. Brit. W. Ind.* 332; *Cat. Pl. Cub.* 131. — Gray, *Syn. Fl. N. Am.* i. pt. ii. 30. — Sauvalle, *Fl. Cub.* 65. — A. R. Northrop, *Mem. Torrey Bot. Club*, xii. 67. — Small, *Fl. Southeastern U. S.* 1112. — Britton & Shafer, *N. Am. Trees*, 846, f. 769.

MATTHIOLA SCABRA, Linnæus, *Spec.* 1192 (1753).

GUETTARDA RUGOSA, Swartz, *Prodr.* 59 (1788).

GUETTARDA AMBIGUA, A. Richard, *Fl. Cub.* iii. 20 (not De Candolle) (1853). — Chapman, *Fl.* 178.

Leaves persistent, oval, oblong or ovate, acuminate or rounded and apiculate at the apex, gradually narrowed or broad at the rounded or subcordate base, entire, coriaceous, dark green, hispidulose-papillose and scabrate on the upper surface, pale and soft-pubescent on the lower surface, from 5 to 13 centimetres long and from 3 to 8 centimetres wide, with thickened slightly revolute margins, stout midribs, usually from eight to eleven pairs of prominent primary veins and conspicuous reticulate veinlets; petioles stout, rusty-pubescent, from 1 to 2 centimetres in length; stipules concave at the base, gradually narrowed above into a long slender point, pubescent, from 1 to 2 centimetres in length. Flowers sessile or short-pedicellate in the axils of acute bracts, in axillary pedunculate cymes on slender rusty-pubescent peduncles from 4 to 5 centimetres in length; calyx short-oblong, produced above the ovary into a four-lobed tube, densely pubescent on the outer surface; corolla often 2.5 centimetres in length, the slender tube retrorsely silky-villose on the outer surface, the lobes five to seven, usually five, imbricated in the bud, oblong-obtuse; stamens inserted in the tube of the corolla, as many as and alternate with its lobes; filaments free, short; anthers oblong-linear, included, two-celled, introrse, opening longitudinally; ovary inferior, four-celled, the cells tubular; style slender, shorter than the tube of the corolla; stigma capitate; ovule solitary in each cell, suspended on the thickened funicle from the inner angle of the cell; raphe ventral; micropyle superior. Fruit a fleshy one-stoned four- to nine-seeded subglobose pubescent drupe from 6 to 7 millimetres in diameter and crowned by the persistent tube of the calyx; flesh thin and dry; stone thick-walled, slightly angled; seed compressed, suspended on the thick funicle closing the orifice of the wall of the stone; albumen thin and fleshy; embryo elongated; cotyledons flat, minute, not longer than the elongated terete radicle turned toward the hilum.

A tree, in Florida sometimes from 7 to 8 metres high, with a tall trunk from 5 to 6 centimetres in diameter, small ascending branches forming an open irregular head, and stout or slender branchlets ascending at narrow angles, densely covered during their first season with rufous pubescence, and light reddish brown, slightly pubescent and marked by the conspicuous leaf-scars in their second year. Flowers produced irregularly during the winter and early spring. Fruit ripens in the autumn.[1]

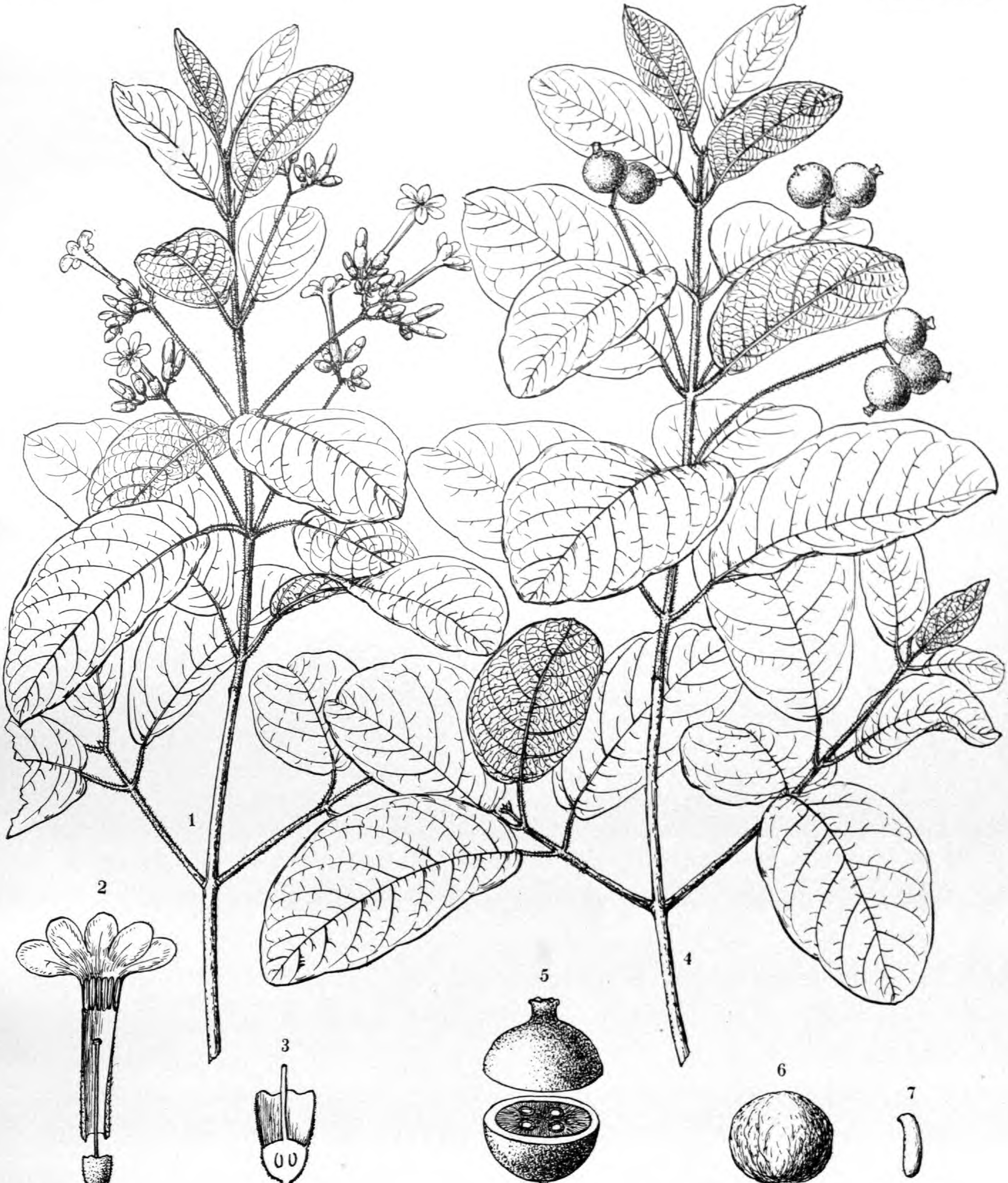
Florida: Dade County, near Miami, *A. H. Curtiss;* on the keys of the Everglades, where it is one of the commonest of the small undergrowth trees, Paradise Key, *E. A. Bessey*, May, 1908 (No. 18); *R. M. Harper*, March 29, 1909 (No. 109); on the southern keys, No Name Key, *A. H. Curtiss*, March, 1882 (all in herb. Arnold Arboretum); on the Bahama and on several of the West Indian Islands. C. S. S.

[1] The earliest figure of this tree appeared in Plumier's *Nova Plantarum Americanarum Genera* published in 1703, where it is described as *Matthiola folio aspero, subrotundo, fructu nigricante*, 16, t. 6, f. 2.

EXPLANATION OF THE PLATE.

PLATE CLXXIII. GUETTARDA SCABRA.

1. A flowering branch, natural size.
2. A flower with the corolla laid open, enlarged.
3. Vertical section of an ovary, enlarged.
4. A fruiting branch, natural size.
5. A fruit divided transversely, enlarged.
6. A stone, enlarged.
7. A seed, enlarged.



C. E. Faxon del.

GUETTARDA SCABRA, Lam.

PSYCHOTRIA, L.

(Rubiaceæ.)

Psychotria, Linnæus, *Syst.* ed. 10, 929 (1759). — Meissner, *Gen.* 169. — Endlicher, *Gen.* 532. — Bentham & Hooker, *Gen.* ii. 123. — Engler & Prantl, *Pflanzenfam.* iv. pt. iv. 112.

Myrstiphyllum, P. Browne, *Hist. Jam.* 152 (1756). — Hiern, *Cat. Afric. Pl. Welwitsch,* ii. 493 (1898).

Psychotrophum, P. Browne, *Hist. Jam.* 160 (1756).

Patabea, Aublet, *Pl. Guian.* i. 110 (1775).

Ronabea, Aublet, *Pl. Guian.* i. 154 (1775).

Simira, Aublet, *Pl. Guian.* 170 (1775).

Stellix, Noronha, *Verh. Bat. Gen.* v. Art. iv. 4 (1790).

Hylacium, Palisot de Beauvois, *Fl. Ow. et Ben.* ii. 83 (1807).

Dychotria, Rafinesque, *Ann. Gén. Sci. Phys.* vi. 85 (1820).

Polyozus, Blume, *Bijdr.* 947 (1826).

Acmostima, Rafinesque, *Sylva Tellur.* 26 (1838).

Pleureia, Rafinesque, *Sylva Tellur.* 147 (1838).

Sulcanux, Rafinesque, *Sylva Tellur.* 148 (1838).

Myrstiphylla, Rafinesque, *Sylva Tellur.* 148 (1838).

Cleisocratera, Korthals, *Temminck Verh. Nat. Geschied. Bot.* 256 (1842).

Trevirania, Heynhold, *Nom.* ii. 736 (1846).

Streblosa, Korthals, *Nederl. Kruidk. Arch.* ii. pt. ii. 245 (1851).

Gloneria, André, *Ill. Hort.* xviii. 76 (1871).

Uragoga, Baillon, *Adansonia,* xii. 324 (in part, not Linnæus) (1879).

Psychotrion, St. Lager, *Ann. Sci. Bot. Lyon,* vii. 132 (1880).

Trees, shrubs sometimes climbing, or rarely herbs, with watery juices and terete or four-angled branchlets. Leaves opposite, rarely in verticils of three or four; stipules interpetiolar, solitary or in pairs, often connate into a sheath, deciduous or persistent. Flowers regular, perfect or rarely polygamo-diœcious, small, green, rose color or yellow, in terminal or rarely axillary corymbose cymes or panicles naked or furnished with bracts; calyx short, adnate to the ovary, five- or rarely four-lobed; corolla funnelform, tubular or suborbicular, the tube short or elongated, naked, pilose or villose in the throat, the limb five- or rarely four- or six-lobed, the lobes valvate in the bud; disk epigynous, annular; stamens five, rarely four or six, inserted on the tube of the corolla; filaments subulate; anthers linear or oblong, obtuse, attached on the back near the base, introrse, two-celled, the cells opening longitudinally; styles short or elongated, naked or pilose; stigma two-cleft or two-lobed, the lobes short, subulate or linear, rarely spatulate; ovule solitary, erect from the bottom of each cell, anatropous, raphe ventral, micropyle inferior. Fruit baccate or drupaceous, small, ovoid, globose or pyriform, rarely in pairs, smooth or ribbed, two-celled and two-seeded; seeds filling the cavity of the cells, the back convex, smooth, ribbed or sulcate, the ventral face flat or rarely concave, often longitudinally sulcate; testa thin; albumen fleshy or

horny, regular or ruminate; embryo dorsal near the base of the seed; cotyledons flat, ovate, orbicular or lanceolate, radicle terete, inferior.

Psychotria with at least five hundred species is widely distributed through the tropics of the two hemispheres, the larger number being found in America. Two West Indian species reach southern Florida; of these *Psychotria nervosa*, although usually a shrub, is now found to attain occasionally the size and habit of a small tree, and *Psychotria tenuifolia*[1] is a small shrub.

The generic name, from ψμχή and τρέφειν, changed by Linnæus from Psychotrophum of Patrick Browne, is in allusion to the fact that the seeds of some of the species have been used as a substitute for coffee.[2]

C. S. S.

[1] Swartz, *Prodr.* 43 (1788); *Fl. Ind. Occ.* i. 402. — De Candolle, *Prodr.* iv. 514. — Maycock, *Fl. Barb.* 92. — Grisebach, *Fl. Brit. W. Ind.* 341. — Eggers, *Bull. U. S. Nat. Mus.* xiii. 61 (*Fl. St. Croix and the Virgin Islands*). — Gray, *Syn. Fl. N. Am.* i. pt. ii. 31. — Coombs, *Trans. St. Louis Acad. Sci.* vii. 430. — Duss, *Ann. Inst. Col. Marseille*, iii. 343 (*Fl. Phaner. Antill. Franç.*). — Small, *Fl. Southeastern U. S.* 1113.

Psychotria lanceolata, Chapman, *Fl.* 177 (in part, not Nuttall) (1864).

[2] Older names than Psychotria for this genus are Myrstiphyllum and Psychotrophum of Patrick Browne; but these are among the *nomina rejicienda* of the Vienna Congress, at which the rules of botanical nomenclature now in use were established.

PSYCHOTRIA NERVOSA, Sw.

PSYCHOTRIA NERVOSA, Swartz, *Prodr.* 43 (1788); *Fl. Ind. Occ.* i. 403. — De Candolle, *Prodr.* iv. 514.

PSYCHOTRIA UNDATA, Jacquin, *Hort. Schœnb.* iii. 5, t. 260 (1798); *Frag. Bot.* 29. — De Candolle, *Prodr.* iv. 513. — Grisebach, *Fl. Brit. W. Ind.* 342. — Chapman, *Fl.* 177. — Gray, *Syn. Fl. N. Am.* i. pt. ii. 30. — Small, *Fl. Southeastern U. S.* 1113. — Britton & Shafer, *N. Am. Trees*, 847, f. 770.

PSYCHOTRIA CHIMARRHOIDES, De Candolle, *Prodr.* iv. 514 (1830). — A. Richard, *Fl. Cub.* iii. 26.

PSYCHOTRIA OLIGOTRICHA, De Candolle, *Prodr.* iv. 514 (1830).

MYRSTIPHYLLUM UNDATUM (Jacquin), Hitchcock, *Rep. Mo. Bot. Gard.* iv. 95 (1893).

Leaves oval to elliptical-lanceolate or slightly obovate, acuminate at the ends, entire, thin, glabrous, dark green on the upper surface, pale on the lower surface, from 12 to 20 centimetres long and from 3 to 6 centimetres wide, with narrow prominent midribs and thin slightly ascending primary veins; petioles slender, narrowly wing-margined at the apex, from 1 to 5 centimetres in length; stipules large, obtuse, apiculate, sphacelate-scarious, united into a sheath splitting down one side, caducous. Flowers perfect, in sessile naked terminal corymbose cymes, enclosed in the bud in the stipules of the two upper leaves, their primary and secondary divisions usually three-branched; calyx minutely five-lobed; corolla tubular, white, villose in the throat of the tube, the lobes acute, shorter than the tube; stamens exserted; style shorter than the corolla, naked; stigma two-lobed. Fruit baccate, short-oblong, smooth, crowned by the calyx-lobes, red, from 6 to 7 millimetres long; flesh very thin; seeds slightly ribbed on the back, light brown; albumen horny, ruminate.

In Florida usually shrubby, but occasionally in the rich hammocks along the shores of Bay Biscayne a slender tree from 5 to 7 metres high, with a stem from 12 to 15 centimetres in diameter covered with smooth pale bark, spreading branches and slender glabrous branchlets pale green when they first appear, becoming light yellow-brown during their first season. Flowers irregularly in spring and autumn. Fruit ripening six months later.[1]

Florida: from the neighborhood of St. Augustine, southward along the east coast to Dade County, and in Lake County (*G. V. Nash* No. 978); also on the Bahama and on many of the West Indian Islands. C. S. S.

[1] A form of this species in which the lower surface of the leaves, especially on the midribs and primary veins, the petioles and young branchlets are covered with rufous hairs, may be distinguished as:

Var. LANCEOLATA (Nuttall), *nov. var.*

Psychotria lanceolata, Nuttall, *Am. Jour. Sci.* v. 290 (1822). — De Candolle, *Prodr.* iv. 513. — Chapman, *Fl.* 177 (in part).

Rich woods, St. Augustine, Florida, Miss Reynolds (in herb. Arnold Arboretum ex herb. W. M. Canby).

EXPLANATION OF THE PLATE.

PLATE CLXXIV. PSYCHOTRIA NERVOSA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A corolla with stamens laid open, enlarged.
5. A pistil, enlarged.
6. A cluster of fruits, natural size.
7. Vertical section of a fruit, enlarged.
8. A fruit divided transversely, enlarged.
9. A seed, ventral face, enlarged.
10. A seed, dorsal face, enlarged.
11. An embryo, enlarged.

C. E. Faxon del.

PSYCHOTRIA NERVOSA, Sw.

SAMBUCUS SIMPSONII, REHD.

SAMBUCUS SIMPSONII, *n. sp.*

Leaves pinnate, glabrous, with their petioles from 10 to 16 centimetres long; leaflets usually five, sometimes seven, rarely three, the terminal leaflet obovate or oblong-obovate, short-acuminate, gradually narrowed at the base into a slender petiolule from 1 to 1.5 centimetres in length, the lateral leaflets broadly elliptical to elliptical-oblong, short-acuminate, broadly cuneate at the base, those of the upper pair usually sessile; those of the lower pair on short stalks rarely more than 3 millimetres long, serrate except at the base, with small, slightly spreading serratures, dark yellowish green, lustrous and glabrous on the upper surface, with the exception of a few scattered hairs on the midribs, paler and glabrous on the lower surface, from 3.5 to 7 centimetres long and from 1.5 to 3.5 centimetres broad; petioles glabrous, from 3 to 4 centimetres in length. Flowers white, slightly fragrant, on slender pedicels, in convex or sometimes flat cymes, from 8 to 20 centimetres in diameter, with four or five rays, the terminal ray as long or longer than the lateral rays, rarely shorter; calyx-tube ovoid, the lobes ovate-oblong, acutish, about as long as the tube and slightly exceeding the thick conical style; stamens about as long as the oval lobes; ovary usually five-, rarely four-celled. Fruit subglobose, dark purplish black, about 5 millimetres in diameter; seeds usually five, triangular-oblong, 3 millimetres long, with a red-brown irregularly corrugated testa.

A small tree, sometimes 5 metres high, with a trunk 2 decimetres in diameter, covered with light brownish gray bark divided by deep furrows into flat rather narrow ridges, and slightly angled branchlets greenish when they first appear, becoming light yellowish gray and during their second and third years sometimes covered with thick corky excrescences. The white pith on two- or three-year old branches is comparatively narrow, occupying only about one third of the diameter of the stem.

Florida: Bradentown, Manatee County, *J. H. Simpson*, June, 1910 (type); Eustis, Lake County, *G. V. Nash*, April 1–5, 1894 (No. 377) (in herb. Arnold Arboretum).

Sambucus Simpsonii is closely related to *Sambucus canadensis*, which is easily distinguished by the thinner bark of the stems with only shallow fissures, by the branches without excrescences and with ample pith, the seven- to nine-foliolate leaves with usually oblong and larger leaflets more or less pubescent beneath, at least while young, by the larger cymes with a much shorter central ray, and by the generally four-celled or sometimes three-celled and only exceptionally five-celled ovary, also by its usually shrubby habit.[1]

Nash's specimens differ slightly from Simpson's specimens, which I consider the type of the species, in the central ray of the inflorescence being shorter than the lateral rays, as is the case in *Sambucus canadensis*, and in the narrow leaflets of which a few are trifoliate, bearing at the base much smaller lateral leaflets. Otherwise, particularly in the small quite glabrous leaflets, in the five-seeded fruit and in the arborescent habit, it agrees perfectly with the specimens from Bradentown.

Apparently also the following specimens ought to be referred to this species. The labels, however, do not throw any light on the habit of the plants or on the character of their bark. They agree in all other characters with Nash's specimens and also have the lower segments in part of the leaves trifoliolate; this tendency is most pronounced in Curtiss's specimen from Jacksonville, which has three pairs of leaflets distinctly trifoliate, only the uppermost pair being undivided.

Florida: Sanibel Island, *S. M. Tracy*, May 18, 1901 (No. 7453), Lee County, Myers, around bog heads and ponds, *A. S. Hitchcock*, July and August, 1900 (No. 172); Jacksonville, July 4, 1893, *T. H. Rolfs* (No. 156), April 24, 1894, *A. H. Curtiss* (No. 4757); Eustis, *A. S. Hitchcock*, June and July, 1894. Mississippi: Ocean Springs, 1895, *J. Skehan*, June 9, 1899, *S. M. Tracy* (No. 6483). Louisiana: Cameron, July 4, 1903, *S. M. Tracy* (No. 8747).

ALFRED REHDER.

[1] In separating *Sambucus Simpsonii* from *Sambucus canadensis* I have looked over a large amount of herbarium material of *Sam*

bucus canadensis. This exhibits great variation. As none of the American floras have paid much attention to these forms, I have taken this opportunity to propose an enumeration of the varieties and forms which may be or which have been distinguished.

SAMBUCUS CANADENSIS, var. SUBMOLLIS, *n. var.*

Leaves seven- to nine-foliolate, the rachis between the leaflets puberulous or quite glabrous ; leaflets usually oblong-ovate, rounded or broadly cuneate at the base, acuminate, yellowish green and glabrous on the upper surface except the pubescent midrib, paler or grayish green and covered with a soft pubescence beneath ; branchlets and the other parts of the shrub glabrous.

Arkansas : Fulton, *B. F. Bush*, June 11, 1909 (No. 5829 type) (in herb. Arnold Arboretum). Missouri : St. Louis, *G. Engelmann*, June 29, 1860 ; St. Louis, Cliff Cave, *M. Craig*, June, 1908 ; Washington, *J. B. S. Norton*, June 14, 1900 ; Randolph, *K. K. Mackenzie*, July 17, 1898 (No. 257). Illinois : Crève-Cœur Lake, *A. G. Johnson*, June 26, 1905 (all in herb. Mo. Bot. Gard.). Missouri : St. Louis, *A. Rehder*, September 15, 1904 (in herb. Arnold Arboretum). Indian Territory : Sapulpa, *B. F. Bush*, July 22, 1894 (No. 195). Louisiana : Lake Charles, *A. Allison*, 1904 (No. 143). Texas : Dallas, *J. Reverchon*, 1874 and 1880 (No. 384) (in herb. Gray) ; San Antonio, *G. Jermy*, 1904 (in herb. Mo. Bot. Gard.); New Braunfels, F. Lindheimer, 1851 (in herb. Mo. Bot. Gard.).

This variety differs in the persistent and soft pubescence on the under side of the leaves from the type, which has the leaves more or less pubescent only along the midrib and on the veins and is usually nearly glabrous at maturity, although less often a peculiar hirsute persistent pubescence occurs on the midrib on the under side of the leaves, as appears in some eastern specimens, of which the following may be quoted : Connecticut : Middletown, *S. B. Buckley*, July, 1836 (in herb. Mo. Bot. Gard.). Georgia : near Thomasville, *J. K. Small*, May 28, June 6, 1895. District of Columbia : Washington, on Ivy City Road, *F. L. J. Boettcher*, July 12, 1893 (in herb. Mo. Bot. Gard.). Small's specimen from Georgia differs besides in the narrow leaflets and in the pilose rachis. This eastern hirsute form may be the *S. hirta* Tausch (*Flora*, xxi. 737, 1838). In some western specimens of typical *Sambucus canadensis*, particularly from Missouri and Kansas, I find the leaves quite glabrous even in a young state.

A rather striking form with bipinnate leaves of the var. *submollis* is the following :

SAMBUCUS CANADENSIS, var. SUBMOLLIS, f. ENGELMANNII, *n. forma.*

Leaves bipinnate, with three to five pairs of primary segments, the lower ones five-foliolate, with oblong-ovate leaflets, the upper ones undivided, oblong, all soft-pubescent on the under side as in var. *submollis*.

Illinois : Shiloh, on H. Engelmann's grounds, *G. Engelmann*, August 9, 1882 (in herb. Mo. Bot. Gard., type).

SAMBUCUS CANADENSIS, var. OREOPOLA, *n. var.*

Sambucus oreopola, Donnell-Smith, *Bot. Gazette*, xxv. 146 (1898).

Costa Rica : Volcan Barba and Volcan Irazu, alt. 2000 m., *A. Tonduz* (Nos. 2107, 4223, types, not seen); Volcan Turrialba, alt. 1900 m., *H. Pittier*, January, 1889 (Herb. Nat. Costa Rica, No. 13213); Estrella, prov. Cartago, alt. 1400 m., *J. J. Cooper*, December, 1887 (No. 5730, as *S. peruviana*).

Like the preceding variety this is pubescent on the whole under side of the leaflets, but differs from it in its much larger, nine- to eleven-foliolate leaves, in the narrower oblong leaflets from 10 to 18 centimetres long and from 4 to 5 centimetres broad, and in the much larger cymes which attain 35 centimetres in diameter.

Other Central American and Mexican forms referred to *Sambucus canadensis* do not seem to belong there, but are apparently more closely related to *Sambucus mexicana* Presl and *Sambucus bipinnata* Chamisso and Schlechtendal. They have the short filaments of these species, although they are sometimes nearly or quite glabrous.

A green-fruited form of *Sambucus canadensis*, a counterpart of *Sambucus nigra viridis* Ait., has recently been found growing wild by Mr. D. Desmond, near Wilmington Junction, New Hampshire, and is now in cultivation at the Arnold Arboretum. It may be distinguished as :

SAMBUCUS CANADENSIS, f. CHLOROCARPA, *n. forma.*

This differs from the type in its pale green fruits. Leaves pale yellowish green with seven or sometimes five elliptic leaflets from 6 to 7 centimetres long and slightly pubescent on the veins beneath at maturity ; fruit usually four-, rarely three-seeded.

In addition to the forms here described the following forms of *Sambucus canadensis* have been previously distinguished :

SAMBUCUS CANADENSIS, var. LACINIATA, Gray, *Syn. Fl. N. Am.* i. pt. ii. 9 (1884).

Leaves bipinnate, usually with three pairs or sometimes with four pairs of primary segments, the lower leaves five-foliolate or rarely three-foliolate, on slender petioles sometimes 1.5 centimetres long, the upper leaflets undivided or sometimes trifoliate, the leaflets glabrous beneath, elliptic-lanceolate to narrowly lanceolate, cuneate at the base.

Florida : Indian River, *E. Palmer*, 1874 (type).

The type specimen preserved in the Gray Herbarium has the leaflets very narrow, about 1 centimetre broad, only a few attaining 1.5 centimetres in width, while a co-type in the herbarium of the Missouri Botanic Garden has the leaflets from 1.5 to 2.5 centimetres broad. This variety has some resemblance to the bipinnate forms of Sambucus Simpsonii, particularly as it is glabrous or nearly glabrous, but the ovaries are always four-celled.

SAMBUCUS CANADENSIS, f. SEMPERFLORENS, Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1909, 36.

Sambucus semperflorens, Bernhardi, *Hamburg. Gart. Blumenzeit.* ii. 488 (as synonym) (1847).

Flowering late in summer a second time or, in wet seasons, uninterruptedly until autumn.

SAMBUCUS CANADENSIS, f. MAXIMA, Hesse, *Preisverzeich.* 1902–03, 92. — Koehne apud Späth, *Kat.* 1903–04, 125. — Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1909, 36.

Sambucus pubens, var. *maxima*, Hesse, *Preisverzeich.* 1897–98, 54 ; *Gartenflora*, xlvii. 582 (1898). — *The Garden*, lviii. 355 (1900).

Cymes very large, attaining 45 centimetres in diameter. The whole plant very vigorous, with large leaves.

SAMBUCUS CANADENSIS, f. ACUTILOBA, Ellwanger & Barry, *Novelties* 1902–04, [4]. — *Flora and Sylva*, i. 151, fig. (1903). — Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1910, 36.

Leaflets seven to nine, the lower ones pinnatifid or almost pinnate, with narrowly lanceolate incisely serrate or entire and usually falcate segments, the upper leaflets serrate or incisely serrate and narrowly lanceolate, all pilose on the veins beneath. Ellwanger & Barry obtained this handsome form from Highland Park, Illinois.

SAMBUCUS CANADENSIS, f. DELICATISSIMA, Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1907, 257 ; 1910, 36.

Leaves yellow ; berries light cherry-red. Originated in Count von Schwerin's garden.

SAMBUCUS CANADENSIS, f. RUBELLA, Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1907, 257.

Young branchlets and pedicels, like the petioles, red on their sunny side ; leaves dull green ; slow-growing. Origin unknown.

SAMBUCUS CANADENSIS, f. TARDA, Schwerin, *Mitt. Deutsche Dendr. Gesell.* 1907, 257.

Slow-growing form with light green foliage ; young branchlets green. Found in Bronx Park, New York.

EXPLANATION OF THE PLATE.

Plate CLXXV. Sambucus Simpsonii.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. A flower with the corolla displayed, enlarged.
4. Cross section of an ovary, enlarged.
5. A fruiting branch, natural size.
6. A seed, ventral face, enlarged.
7. A seed, dorsal face, enlarged.

C. E. Faxon del.

SAMBUCUS SIMPSONII, Rehd.

The Riverside Press
CAMBRIDGE . MASSACHUSETTS
U . S . A

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

Professor Sargent is recognized as the highest authority on the subject he treats. His position as Director of the Arnold Arboretum of Harvard University, the richest dendrological collection in America, which has been formed by him, and his opportunities while in the employ of the government of the United States for exploring the forests and studying the trees in every part of the country, opportunities supplemented by his connection with the Northern Transcontinental Survey, and by the duty intrusted to him of forming for the New York Museum of Natural History a collection to illustrate the forest products of North America, specially qualify him for this work, in the preparation of which he has been actively engaged during the last twenty-five years.

No cost or pains have been spared in the mechanical execution of the illustrations of this work, which has taken the first rank among those great scientific works of which Americans are justly proud. It must always remain a standard authority on the subject which it treats.

The price of the *Silva* is $25 net a volume, or $350 for the set, and only subscriptions for the entire work will be accepted.

Specimen pages and a sample plate will be submitted upon request. Address,

HOUGHTON MIFFLIN COMPANY,
4 Park St., Boston.

MANUAL OF THE TREES OF NORTH AMERICA

(EXCLUSIVE OF MEXICO)

THIS volume contains brief descriptions in plain and simple language of some 630 trees, accompanied by a figure of the leaves, fruits, and flowers of each tree, with keys leading to a ready determination of the genera and species. The illustrations are a feature of the book. They are reproductions of drawings made by Mr. Charles E. Faxon, the artist who made the illustrations for "The Silva of North America," and exhibit in a remarkable degree his skill, knowledge, and taste, — the salient or more characteristic features of each species being shown in an admirable manner.

Professor Sargent's descriptions bring out the botanical characters of each genus and species, its geographical distribution and economic value, and its relationship to other species of the same group growing in other parts of the world. The book represents in condensed form the life-work of the author and of the artist in studying, describing, and illustrating the trees of North America, which they have succeeded in making known as the trees of no other continent are known.

The Manual makes available in convenient form the most essential points of the treasures of information to be found in "The Silva of North America." It will be indispensable to every one interested in nature, but especially to all

BOTANISTS, TEACHERS, FORESTERS,
LANDSCAPE-GARDENERS, HORTICULTURISTS,
NURSERYMEN, PARK SUPERINTENDENTS,
AND THE OWNERS OF COUNTRY PLACES.

As a convenient handbook it will serve as a guide to the trees to persons traveling in different parts of this country. Professor Sargent is, without doubt, the greatest living authority on his subject, and his new work will fill a place similar to that long held by Gray's Manual of Botany.

"An admirable book in every way by a past master in his subject, a book that goes straight to the foundations and that every one that loves trees must have." — *New York Sun.*

"A close study of its pages reveals Professor Sargent's careful methods of work, his accuracy, his clear descriptive powers, his exactitude of statement and his marvellous, wide, and minute knowledge of every branch of the subject. . . . Its standard position as the one authoritative record of North American trees is unquestioned." — *Boston Evening Transcript.*

WITH 644 ILLUSTRATIONS BY C. E. FAXON

In green buckram, 8vo, $6.00, *net.* . Postpaid.

Specimen pages and a sample plate will be submitted upon request. Address

HOUGHTON MIFFLIN COMPANY
4 Park Street, Boston

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

PREPARED CHIEFLY FROM MATERIAL AT
THE ARNOLD ARBORETUM OF
HARVARD UNIVERSITY

AND EDITED BY

CHARLES SPRAGUE SARGENT

Director of the Arnold Arboretum; Author of
The Silva of North America

VOL. II, PART IV

Issued August 1913

BOSTON AND NEW YORK
HOUGHTON MIFFLIN COMPANY
The Riverside Press, Cambridge
1913

TREES AND SHRUBS

ILLUSTRATIONS OF

NEW OR LITTLE KNOWN LIGNEOUS PLANTS

THIS work consists of a series of plates, accompanied by brief descriptions, of new or little known trees and shrubs. It is edited by Professor C. S. Sargent, the author of *The Silva of North America* and the Director of the Arnold Arboretum of Harvard University, with the assistance of a number of specialists; and the plates are reproductions of original drawings made by Mr. C. E. Faxon, the most skillful and experienced botanical draftsman in America, whose work is familiar to the readers of Professor Sargent's *Silva* and of *Garden and Forest.* The material which serves as a basis for the work has been derived largely from the living collections and herbarium of the Arnold Arboretum. It will not be confined wholly to North American plants, but will include also the woody plants of other regions, especially those of the northern hemisphere which may be expected to flourish in the gardens of the United States and Europe, and those of special commercial or economic interest and value. This publication does not duplicate in any way *The Silva of North America,* but is supplementary to that publication, as from time to time it will contain descriptions and figures of trees newly discovered in North America.

The work will be published in parts at irregular intervals. Each part will contain twenty-five plates, and a volume will consist of four parts. The parts will be sold separately, at $5.00 *net,* carriage paid. A title-page and an index for each volume will be furnished with the fourth part.

A prospectus containing specimen pages of Part I, and two of the plates, will be submitted upon request. Address

HOUGHTON MIFFLIN COMPANY

4 PARK STREET, BOSTON

THRINAX WENDLANDIANA, Becc.

Thrinax Wendlandiana, Beccari, *Webbia*, ii. 265 (1907).
Porothrinax pumilio, Wendland ex Grisebach, *Cat. Pl. Cub.* 221 (1866).
? Thrinax Martii, Grisebach & Wendland, *Cat. Pl. Cub.* 221 (1866).
Thrinax parviflora, Sauvalle, *Fl. Cub.* 152 (in part ? not Swartz) (1873).

Leaves orbicular, flat or more or less plicate, from 7.5 to 9 decimetres in diameter, divided to below the middle into narrow acuminate segments, the basal divisions extending nearly to the ligule, pale yellow-green on the two surfaces; rachis short with a thin undulate border; ligule thick, concave, gradually narrowed into a long point or rarely rounded at the apex; petioles compressed, unarmed, rounded on the upper side, slightly ridged on the lower side, from 6 to 11.4 decimetres in length, 2 centimetres wide at the apex, coated with hoary tomentum and from 5 to 7.5 centimetres broad at the thickened base, their vaginas composed of tough, thin, light brown fibres covered with hoary tomentum. Spadix interpetiolar, stalked, from 6.1 to 12.2 decimetres long, its primary branches short, flattened, incurved, with numerous slender, terete flower-bearing branchlets; flowers on slender pedicels from 2.5 to 3 millimetres in length, deeply six-lobed, the lobes nearly triangular, acuminate; stamens on long slender exserted filaments barely united at the base; style gradually narrowed into a small oblique stigma. Fruit globose, from 6 to 7 millimetres in diameter, with juicy bitter ivory white flesh, easily separable from the thin-walled tawny brown nut; seed free; erect, slightly flattened at the ends, hilum sub-basilar, oblong, pale and conspicuous; raphe short-branched; albumen uniform, penetrated to the apex by the broad basal cavity; embryo lateral.

A tree, in Florida from 7 to 8 metres high, with a smooth trunk from 8 to 10 centimetres in diameter.[1]

Florida: Dade County, *C. T. Simpson* and *J. Soar*, Madeira Hammock,[2] common, April 4 and December, 1911, Pumpkin Key, December, 1911, Flamingo, near Cape Sable, and northwest of Cape Sable, November, 1912. Cuba, *C. Wright* (No. 2329 in Herb. Gray, type). Mugueres Island, Bay of Honduras, *F. G. Gruner* (teste *Beccari*).

C. S. S.

[1] From *Thrinax floridana* Sargent, the other Florida species with long pedicels, *Thrinex Wendlandiana* differs in the acuminate lobes of the perianth, in the longer filaments, and in the style which is gradually narrowed into the small oblique stigma, that of *Thrinax floridana* being abruptly enlarged into a larger and more oblique stigma. The leaves of *Thrinax Wendlandiana* are green on both surfaces, while those of *T. floridana* are silvery white on the lower surface.

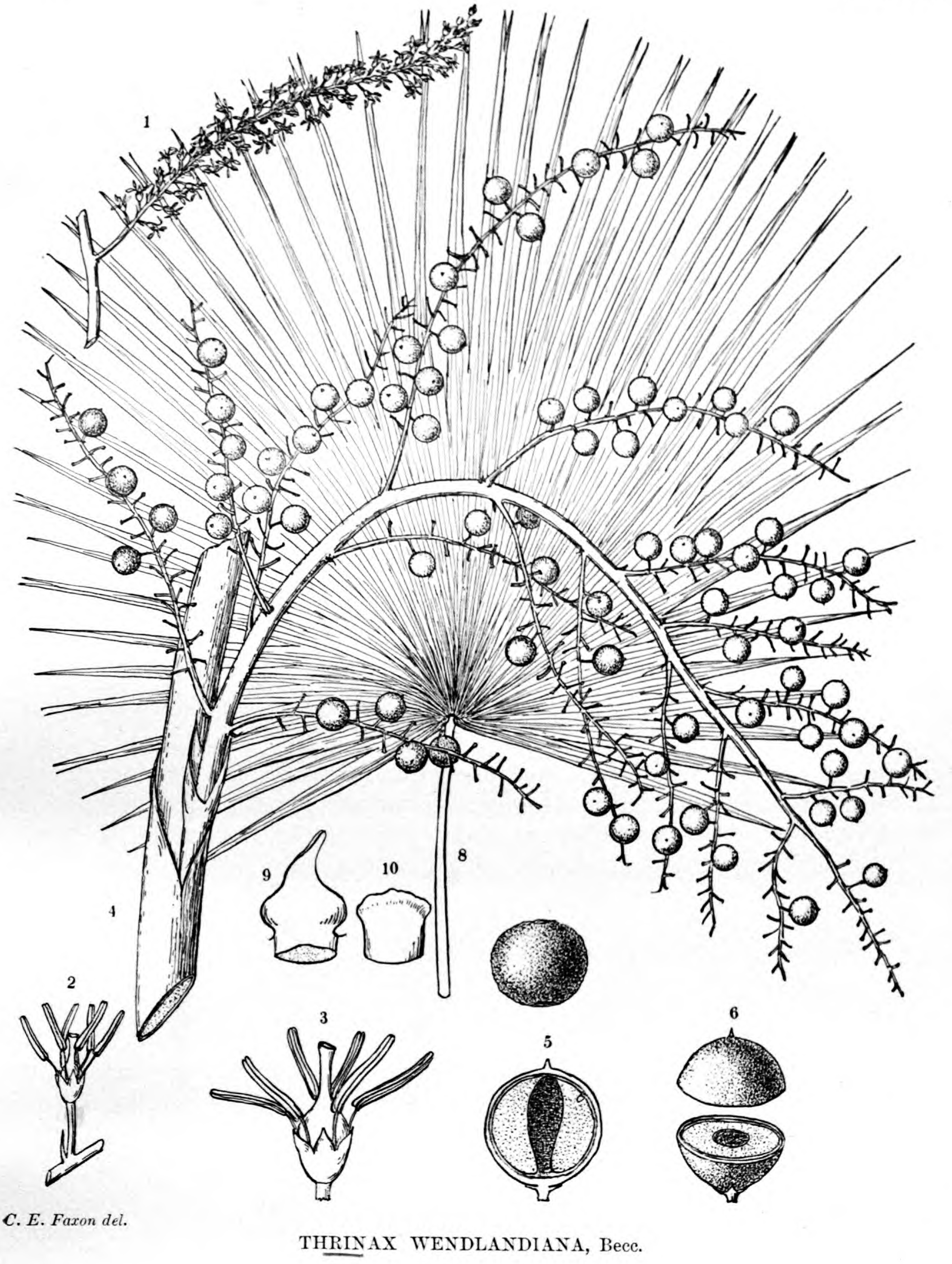
[2] Madeira Hammock is a long narrow strip of marshy land extending along the south end of Dade County, and usually considered a part of the mainland rather than a key; it is intersected by channels of brackish water running into the interior where there are lagoons surrounded by a dense grove of Mangroves. *Thrinax Wendlandiana* was found by Simpson and Soar about six miles west of the Key West extension of the Florida East Coast Railroad, and in Range South 60, Range East 38 and 39.

EXPLANATION OF THE PLATE.

PLATE CLXXVI. THRINAX WENDLANDIANA.

1. Portion of a spadix with flowers, natural size.
2. A flower with its pedicel, enlarged.
3. A flower, enlarged.
4. Portion of a spadix with fruit, natural size.
5. Vertical section of a fruit, enlarged.
6. A fruit divided transversely, enlarged.
7. A seed, enlarged.
8. A leaf, upper surface, much reduced.
9. A ligule, natural size.
10. A rachis, natural size.

Nos. 1, 2 and 3 are from the type specimen No. 2329 collected by C. Wright and preserved in the Gray Herbarium.
Nos. 4, 5, 6, 7, 8, 9 and 10 are from specimens collected by C. T. Simpson and J. Soar on Madeira Hammock.



C. E. Faxon del.

THRINAX WENDLANDIANA, Becc.

CARYA FLORIDANA, SARG.

CARYA FLORIDANA, *n. sp.*

Leaves from five- to seven-, usually five-, foliate, with slender petioles scurfy-pubescent when they first appear, soon becoming glabrous, and from 1.5 to 2 decimetres long; leaflets lanceolate to oblanceolate, long-pointed and acuminate at the apex, unsymmetrical and rounded or cuneate at the base, serrate with remote cartilaginous teeth, sessile or the terminal leaflet occasionally short-petiolulate; when they unfold thickly covered with rufous pubescence, soon becoming entirely glabrous, and at maturity conspicuously reticulate-venulose, the three upper leaflets from 9 to 10 centimetres long and from 2.5 to 5 centimetres broad, and about twice larger than those of the lower pairs. Staminate inflorescence long-pedunculate, scurfy pubescent, from 2.5 to 3 centimetres in length, produced at the base of shoots of the year from the axils of bud-scales, and also from the axils of leaves; pistillate inflorescence not seen. Fruit without wings or very slightly winged at the sutures, obovate, gradually narrowed and rounded at the apex, cuneate at the base, slightly four-angled, covered with yellowish brown scales, about 2.5 centimetres long and 2 centimetres in diameter; involucre from 2 to 2.5 millimetres thick, splitting freely to the base, usually by two sutures and to the middle by a third suture, the fourth usually remaining closed; nut subglobose, usually slightly flattened, rounded or occasionally acute at the base, acute at the apex, slightly ridged to the base, pale reddish brown, the reticulate veins deeply impressed, about 2 centimetres long and 1.8 centimetre wide, with a shell from 2 to 3 millimetres thick, and a small seed.

A tree, from 18 to 25 metres high, with a trunk sometimes 4 decimetres in diameter, covered with slightly ridged dark gray-brown close bark, spreading branches forming a broad head, and slender branchlets coated when they first appear with rufous scurfy pubescence, soon becoming puberulous, and at the end of their first season glabrous, rather bright red-brown and marked by numerous pale lenticels. Scales of the winter-buds valvate, thick, covered with yellow-brown scurfy scales, the lateral sessile or stipitate; terminal buds not collected. Flowers in February. Fruit ripens in June.

Eastern Florida: in sandy soil in the Indian River region, Volusia County, common: Eldred, *B. K. McCarty*, June 1, 1911 (type), *T. G. Harbison*, March, 1913; near Georgiana, Merritt's Island, *W. M. Canby*, February 16, 1889; sandy woods near Rock Ledge, *W. M. Canby*, February, 1889.

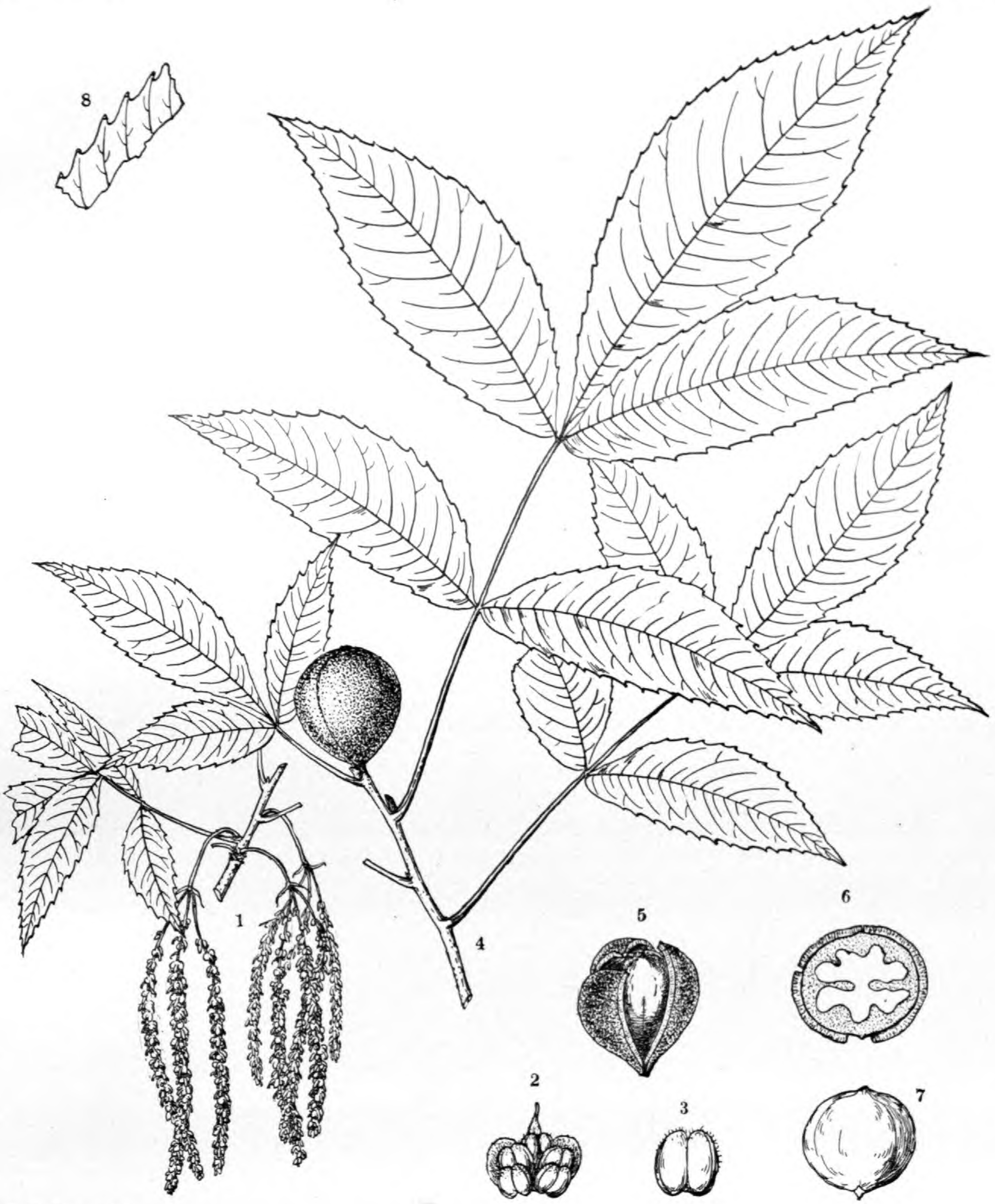
Carya floridana differs from all described species of the genus in the production of some of the aments of staminate flowers from the axils of leaves; from the other species with valvate bud-scales it differs in the number of leaflets which are only five, while in the other species of this section they vary from seven to eleven, thirteen or fifteen. This is also the only species of this group with obovate fruit; the sessile or nearly sessile terminal leaflet and the cartilaginous teeth of the leaflets are unusual.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXVII. CARYA FLORIDANA.

1. A branch with staminate inflorescence, natural size.
2. A staminate flower, enlarged.
3. A stamen, enlarged.
4. A fruiting branch, natural size.
5. A fruit, natural size.
6. Cross section of a fruit, natural size.
7. A nut, natural size.
8. Margin of a leaflet, enlarged.



C. E. Faxon del.

CARYA FLORIDANA, Sarg.

CARYA BROWNII, SARG.

(Carya cordiformis × pecan.)

The Mayfield Nut.

CARYA BROWNII, *n. hyb.*

Leaves from 2.5 to 3 decimetres long, with stout petioles tomentose early in the season, becoming nearly glabrous; leaflets eleven or rarely nine, acuminate, coarsely serrate with incurved teeth, the terminal leaflet acuminate and symmetrical at the base, and raised on a slender petiolule often from 5 to 8 millimetres in length, the lateral falcate, unsymmetrical at the base, the upper side rounded, the lower nearly straight, and subsessile or short-pedunculate; when they unfold covered above by small pale glands and villose on the midribs, and villose below especially on the midribs and veins, and at maturity yellow-green, lustrous and glabrous on the upper surface, pale yellow-green and glabrous on the lower surface with the exception of a few hairs on the midribs and in the axils of the veins, from 9 to 13 centimetres long and from 2 to 4 centimetres wide. Staminate flowers sessile, in villose aments from 8 to 10 centimetres long, from buds formed the previous year, on peduncles from 6 to 7 millimetres in length; calyx pubescent, about half as long as the bract. Pistillate flowers slightly angled, scurfy-pubescent, in from two- to four-flowered spikes. Fruit broadly ovate, acute at the apex, rounded at the broad base, narrow-winged to below the middle or nearly to the bottom, dark reddish brown and more or less thickly covered with yellow scurfy pubescence, from 3.5 to 4 centimetres long and from 2 to 2.2 centimetres wide, the valves thin and splitting freely; nut oblong to slightly obovate, rounded at the base, broad and rounded and abruptly narrowed and acute at the apex, compressed, slightly angled at the apex only, light-colored, from 3 to 3.5 centimetres long, from 2 to 2.2 centimetres wide, with a thin shell and bitter seed.

A tree, from 10 to 15 metres high, with a trunk from 3 to 3.5 decimetres in diameter, covered with close pale bark, and stout branchlets thickly covered when they first appear with hoary tomentum, becoming in their first winter light reddish brown, puberulous and covered with small pale lenticels. Winter-buds only slightly compressed, covered with yellow scurfy pubescence, the terminal from 1 to 1.2 centimetres long and about twice as large as the lateral buds. Flowers the beginning of May. Fruit ripens in October.

A single tree, growing near a small grove of *Carya pecan* on the bottom-lands of the Arkansas River two miles below Van Buren, Crawford County, Arkansas, and near the River road, *G. M. Brown* (No. 7), April, May, June and October, 1909. This tree, which is evidently a hybrid between the Pecan and the Bitternut, resembles the Pecan in habit and in the color and general appearance of the foliage. The leaves remain on the branches after all those of the Pecans in the region have fallen, and in their fewer leaflets approach those of the Bitternut. The aments of the staminate flowers are produced from branches of the previous year, as is usually the case with the Pecan, but they are pedunculate like those of the Bitternut. The fruit is ovate and rounded at the base, much broader in proportion to its length than that of the Pecan, and much longer than the subglobose or short-oblong fruits of the Bitternut. It has the glandular scurfy pubescence of the Bitternut without the articulate hairs found on the fruit of the Pecan. The husk of the Pecan opens and discharges the nuts, remaining on the branches during the winter. From this hybrid about half of the nuts are discharged in this way. The nut is compressed, not cylindrical like that of the Pecan, light-colored although not as light-colored as that of the Bitternut.

I take much pleasure in associating with this interesting tree the name of Mr. George M. Brown, engineer of the municipal waterworks of Van Buren, who has made many observations on the trees of western Arkansas. The name Mayfield was given to it by Mr. Brown as the nut was first shown to him by Joseph Mayfield of Van Buren.

The Galloway nut, which was found several years ago in Hamilton County, Ohio, by S. G. Galloway is probably a hybrid of the same parentage.[1] The leaves, however, resemble those of the Bitternut. The staminate inflorescence is produced from branchlets of the year and of the previous year, and the nuts are sometimes distinctly obovate, much smaller and darker-colored than those of the Van Buren tree. The branchlets are more slender, darker-colored and more pubescent.[2]

[1] S. Galloway, *Gardening*, ii. 2, 26 f. (1894). — Sargent, *Silva N. Am.* vii. 138. — Trelease, *Rep. Missouri Bot. Gard.* vii. 33, t. 16, f. 15–16, t. 20.

[2] A tree which is evidently a hybrid and probably of the same parentage may be described as —

CARYA BROWNII, var. VARIANS, *n. var.*

Leaves from seven- to nine-foliate, from 3 to 3.5 decimetres long, with slender petioles tomentose early in the season, becoming glabrous; leaflets oblong-obovate to lanceolate, acute, acuminate or rounded at the apex, coarsely serrate, the terminal acute and symmetrical at the base and raised on a petiolule often 1.5 centimetres long, the lateral sometimes slightly falcate, rounded at the unsymmetrical base and short-petiolulate; when they unfold ciliate on the margins, pubescent above and densely tomentose below, and at maturity thin, dark green and glabrous on the upper surface, light yellow-green and glabrous on the lower surface with the exception of small axillary tufts of white hairs, from 8 to 14 centimetres long and from 5 to 6 centimetres wide. Aments of staminate flowers from branchlets of the year and of the previous year, pedunculate, slightly villose, from 1 to 1.2 decimetres long; bract of the flower acute, about one-third longer than the ciliate calyx-lobes; anthers four, covered with long white hairs. Inflorescence of the pistillate flowers short-pedunculate, the involucre slightly angled, villose, the bract and bractlets acuminate, villose. Fruit oblong, cylindrical, acute at the apex, gradually narrowed and rounded at the base, coated with yellow scurfy pubescence, from 3 to 3.5 centimetres long and from 1.6 to 1.8 centimetres in diameter, the husk about 2 millimetres thick and splitting freely by winged sutures to below the middle or to the base; nut oblong, rounded at the base, acute and short-pointed at the apex, nearly cylindrical, or slightly compressed, pale brown more or less marked by dark red-brown stripes and blotches, about three centimetres long and from 1.5 to 1.8 centimetres in diameter, with a shell not more than 2 millimetres thick and bitter cotyledons.

A tall tree, with three large stems covered with thick dark bark, that of the branches smooth and pale, and stout branchlets covered when they first appear with floccose tomentum and in their first winter dark red-brown, puberulous and marked by small pale lenticels. Terminal buds ovate, acute or acuminate, only slightly compressed, their valvate outer scales thickly coated with bright golden scurfy pubescence, the terminal from 7 to 8 millimetres long and about as large as the usually stalked upper bud of the two or three superposed axillary buds.

A single large tree known locally as the Bitter Pecan growing in alluvial soil on the moist banks of Lee's Creek, near the pump house of the Van Buren waterworks, valley of the Arkansas River, near Van Buren, Crawford County, in the extreme western part of Arkansas.

In foliage this tree resembles that of the Bitternut. The nut in shape is like that of the Pecan but is light-colored. The influence of the Pecan, however, appears not only in the shape of the nut but also in the dark stripes and blotches which distinguish it. The influence of the Bitternut appears also in the very thin shell of the nut and in the bitter cotyledons. The fruit is intermediate in shape between the fruit of the Bitternut and that of the Pecan, and is covered with the scaly pubescence of the former. The winter-buds are covered with the yellow scurfy pubescence, too, of the Bitternut, but in shape they resemble the buds of the Pecan. The axillary buds of the Bitternut are usually single, but in this hybrid they are superposed in clusters of three and the upper bud in the cluster as in the Pecan is much larger than the others and distinctly stalked. From *Carya Brownii* this variety differs in its thinner, less numerous and much less falcate leaflets, in the smaller and much less compressed blotched nut, and in the winter-buds.

Two other hybrids of *Carya cordiformis* may be described here.

CARYA LANEYI, *n. hyb.*

(*Carya cordiformis* × *ovata.*)

Leaves five-foliate, glabrous, with their slender petioles from 3 to 3.5 decimetres in length; leaflets oblanceolate to lanceolate, acuminate at the ends, finely serrate with incurved teeth, very thin, the terminal leaflet and those of the upper pairs short-petiolulate and about 1.5 decimetres long and from 5 to 6 centimetres wide, those of the lower pair nearly sessile, from 1 to 1.1 decimetres long and from 3 to 3.5 centimetres wide. Flowers unknown. Fruit ovate, rounded at the base, acute at the apex, from 3 to 5 centimetres long and 2.5 centimetres in diameter, the involucre from 4 to 5 millimetres thick, splitting to the middle or occasionally to the base by winged sutures; nut compressed, slightly broader above the middle, rounded at the base, gradually narrowed and abruptly acute at the apex, slightly ridged to below the middle or occasionally to the base, pale-colored, reticulately veined, from 3 to 3.2 centimetres long, from 2.7 to 2.8 centimetres wide, and 2 centimetres thick, the shell only from 1 to 1.5 millimetres in thickness; seed large and sweet.

A tree, about forty feet high, with a trunk 5 decimetres in diameter, covered with close smooth dark gray bark, small spreading and ascending pale gray branches and slender red-brown branchlets marked by pale lenticels and pubescent at the end of their first season. Terminal winter-buds slender, acuminate, from 1 to 1.2 centimetres long and from 5 to 6 millimetres in diameter, with imbricated scales, those of the outer series red, glabrous, keeled on the back, early deciduous, the others yellow-green, ciliate on the margins, puberulous and more or less covered with yellow scales, the lateral buds acute, much flattened, yellow-brown, from 4 to 6 millimetres in length, their scales valvate.

A single tree in the Riverview Cemetery, Rochester, New York, *H. B. Brown*, October 11, 1912, *Brown, Dunbar and Sargent*, October 16, 1912.

In the shape of the terminal winter-buds, the width of the leaflets, in the shape of the fruit with its winged sutures and in the thickness of the involucre this tree is intermediate between *Carya cordiformis* and *Carya ovata*. The nut is of special interest, for with the thin shell of the Bitternut it has the large and sweet seed of the Shagbark Hickory, and as the shell is so thin the seed is even larger than that usually produced by that tree. It is therefore one of the most valuable of all the Hickory nuts which have been found, and if the tree can be successfully propagated it should become of much commercial importance.

It is a pleasure to associate with this interesting tree the name of C. C. Laney, the superintendent of the parks of the city of Rochester, who for many years has successfully and actively stimulated the study of the trees, especially the Hickories, of western New York. The remarkable quality of the nuts of this tree was noticed several years ago by Mr. H. B. Brown, the Engineer of the Park Department at Rochester, who had been in the habit of gathering them for family use.

CARYA LANEYI, var. CHATEAUGAYENSIS, *n. hyb.*

(*Carya cordiformis* × *ovata.*)

Leaves seven-foliate, from 1.5 to 2 decimetres long, with slender glabrous petioles; leaflets lanceolate to slightly obovate acuminate, finely serrate with straight or incurved teeth, the terminal acuminate and symmetrical at the base and short-petiolulate, the lateral nearly sessile, often slightly falcate, and unsymmetrical at the rounded base; when they expand coated below and on the petioles with pale tomentum, and hairy and covered above with minute deciduous glands, and at maturity thin, dark yellow-green and glabrous on the upper surface, light yellow-green and glabrous or furnished with minute axillary tufts of pale hairs on the lower surface, from 7 to 12 centimetres long and from 2.5 to 4 centimetres wide. Flowers unknown. Fruit short-oblong, reddish brown, puberulous, marked by numerous small pale lenticels and more or less covered usually only near the base with yellow scurfy pubescence, the involucre about three millimetres in diameter and splitting freely to the base or sometimes only to the middle; nut compressed, oblong, angled to the middle and sometimes nearly to the base, abruptly narrowed and acute at the apex, rounded at the base, from 2 to 2.2 centimetres long and wide and from 1.7 to 1.8 centimetres thick with walls about 2 millimetres in thickness and a bitter seed.

A tree, about 12 metres high, with a trunk from 3 to 4 decimetres in diameter, covered with pale close or slightly scaly bark, and stout glabrous branchlets light reddish or yellow-brown and marked by many small pale lenticels in their first winter, becoming dark gray-brown in their second year. Terminal buds ovate, acuminate, from 1.2 to 1.4 centimetres long, and covered with numerous imbricated pale gray puberulous scales; axillary buds solitary, sessile, compressed, rounded or acute at the apex, yellow-brown, sometimes yellow-pubescent near the base, the outer scales valvate, those of the inner ranks imbricated.

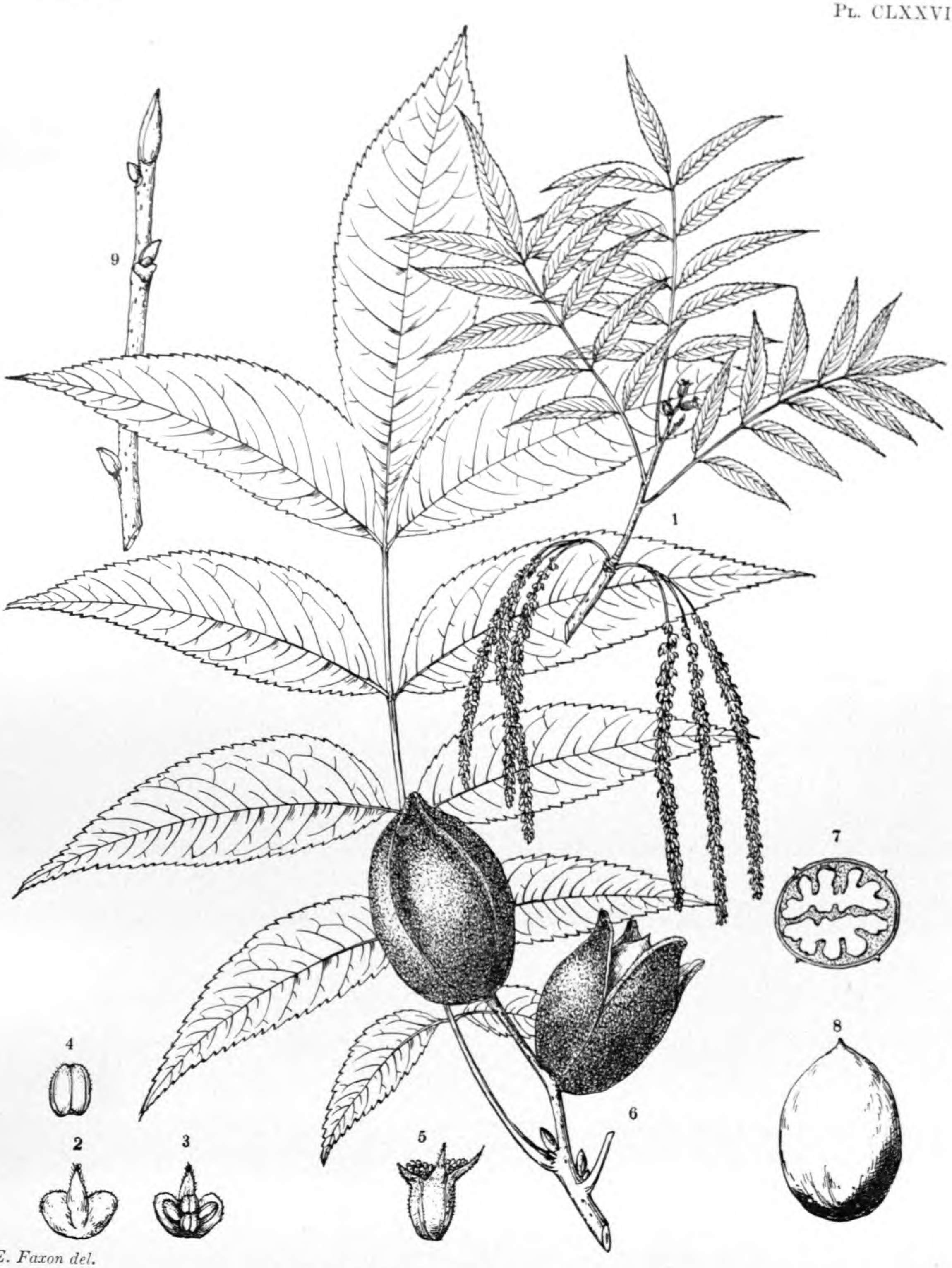
A single tree growing in dense shade with *Carya cordiformis* and *Carya ovata* on the shores of Lake St. Louis of the St. Lawrence River at Chateaugay, near the mouth of the Chateaugay River, Province of Quebec, *J. G. Jack*, May 24, 1894, August 20, 1902, May 17, 1911.

This tree resembles the Bitternut in the number of the leaflets and in their shape, thinness and color. The fruit is larger than that of the Bitternut with a thicker involucre, and the yellow scurfy pubescence of that species is only slightly developed and usually only near the base. It is rounded or pointed and not, like the fruit of the common form of the Shagbark, at all depressed at the apex, and the valves are intermediate in thickness between those of its supposed parents. The nut resembles that of the Shagbark with thicker walls than those of the Bitternut, and the skin of the cotyledons is bitter like that of the Bitternut. The branchlets are paler than those of the Shellbark, and lateral branchlets in their first winter are often nearly as yellow as those of the Bitternut. The terminal winter-buds are smaller, but otherwise resemble those of the Shagbark, and the axillary buds, although shorter, broader and more rounded at the apex than those of the Bitternut, have valvate outer scales and are often yellowish and covered near the base by the yellow scurfy pubescence which is found on the buds of that species. C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXVIII. CARYA BROWNII.

1. A flowering branch, natural size.
2. A staminate flower, rear view, enlarged.
3. A staminate flower, front view, enlarged.
4. A stamen, enlarged.
5. A pistillate flower, enlarged.
6. A fruiting branch, natural size.
7. Cross section of a fruit, natural size.
8. A nut, natural size.
9. A winter branchlet, natural size.



C. E. Faxon del.

CARYA BROWNII, Sarg.

CARYA PORCINA, NUTT.

Pignut.

CARYA PORCINA, Nuttall, *Gen.* ii. 222 (1818).

JUGLANS PORCINA, Michaux, f., *Hist. Arb. Am.* i. 206 (in part) t. 9, f. 3 & 4 (1810).

JUGLANS PORCINA FICIFORMIS, Pursh, *Fl. Am. Sept.* ii. 638 (1814).— W. P. C. Barton, *Compend. Fl. Phila.* ii. 180.

CARYA GLABRA, Spach, *Hist. Vég.* ii. 179 (probably not *Juglans glabra* Miller) (1834).— Gray, *Man.* 412.— Torrey, *Fl. N. Y.* ii. 182 (in part) t. 101.

HICORIA GLABRA, Britton, *Bull. Torrey Bot. Club*, xv. 284 (in part) 1888).— Sargent, *Silva N. Am.* vii. 165 (in part).— Britton & Brown, *Ill. Fl.* i. 487 (in part), f. 1158.

Leaves five- or very rarely seven-foliate, from 2 to 3 decimetres long, with glabrous or rarely pubescent or villose petioles; leaflets lanceolate, acuminate at the ends, and finely serrate with straight or incurved teeth pointing to the apex of the leaflet; when they unfold densely covered on the lower surface and sparingly on the upper surface with yellow scales, ciliate on the margins and glabrous or slightly pubescent on the midribs, and at maturity yellow-green, glabrous above, and glabrous or pubescent on the midribs and often furnished with conspicuous tufts of white tomentum below,[1] the terminal leaflet from 1.3 to 1.5 decimetres long and from 5 to 7 centimetres wide and raised on a glabrous or pubescent petiolule 6 or 7 centimetres in length, the lateral leaflets sessile, those of the upper pair about the size of the terminal leaflet and two or three times larger than those of the lower pair; staminate flowers in short-stalked pubescent aments from 5 to 6 centimetres long, yellow-green, villose, their bracts long-acuminate, slightly villose, much longer than the calyx-lobes; stamens four, filaments villose above the middle; anthers yellow; pistillate flowers in few-flowered spikes, coated with hoary tomentum like the lanceolate acuminate bracts much longer than the bractlets and calyx-lobes. Fruit obovate, compressed, rounded at the apex, gradually narrowed below and often abruptly contracted into a stipe-like base, varying in length from 1.5 to 3.5 millimetres and in width from 2 to 3 centimetres; involucre usually not more than from 1.5 to 2.5 centimetres in thickness, opening generally by one or by two sutures and often remaining nearly closed; nut compressed, obovate, slightly obcordate or acute at the apex, gradually narrowed to the base, not ridged, light-colored with a hard thick shell and a small sweet seed.

A tree, from 20 to 30 metres high, with a trunk covered with close light gray ridged bark, small spreading branches forming a narrow head, and glabrous reddish branchlets marked by pale lenticels. Winter-buds ovate, acute, light brown, glabrous, from 8 to 10 millimetres long, from 5 to 6 millimetres wide, the inner scales covered with close pubescence. Flowers in New England the middle of May; fruit ripens in October.[2]

This tree, which is one of the common Pignuts of the eastern states, is abundant in New England and New York, and ranges southward to Delaware, the District of Columbia, Gloucester County, Virginia, and along the Appalachian

[1] The only really villose tree of this species which I have seen is growing naturally in Seneca Park, Rochester, New York. On this tree the petioles and rachis are thickly covered with matted pale hairs, the leaflets at the end of May are puberulous above and floccosely pubescent below, and in the autumn the petioles, rachis and the midribs below are pubescent.

[2] Mr. Faxon's drawing reproduced in our plate is made from a large tree growing on the estate of Bayard Thayer in Lancaster, Worcester County, Massachusetts.

Mountains to northern Alabama and northern Florida; westward and southwestward it is replaced by other species, and the only specimens I have seen gathered west of New York were from Delaware and Johnston Counties, Indiana (*C. C. Deam*).[1]

There has always been much confusion about this tree. It has sometimes been believed that it was the *Juglans glabra* of Miller; but this is so doubtful, as Miller only described the leaves of a cultivated tree, that *glabra* cannot be safely taken as its specific name. The younger Michaux in his *Juglans porcina* united the pear-shaped and round-fruited Pignuts, and it was Pursh who in his variety *ficiformis* of *Juglans porcina* probably first distinguished our tree. Nuttall adopted without remark Michaux's *porcina*, and as Michaux's description seems to indicate that the tree with pear-shaped fruit was the type of his species Nuttall's *Carya porcina* can perhaps be safely adopted for it, especially as the species described by Clayton, which is quoted by Miller as a synonym of his *Juglans glabra*, cannot be our plant and is probably one of the forms of *Carya ovalis*.

1 A distinct form of the Pignut may be distinguished as —

CARYA PORCINA, var. ACUTA, *n. var.*

In this form the fruit is acute at the apex and gradually narrowed below into a long stipe-like base; it is only slightly compressed, from 3 to 3.5 centimetres long, about 2 centimetres in diameter, with an involucre about 3 millimetres in thickness, splitting usually freely to the middle or occasionally by one suture only to the base. The nut is pale, acute or rarely rounded at the apex, gradually narrowed and acuminate at the base, prominently ridged to the middle, about 2.5 centimetres long, 2 centimetres wide and 1.5 centimetres thick, with a shell 2.5 millimetres in thickness.

A tree, sometimes 25 metres high with a trunk from 3 to 4 decimetres in diameter, covered with pale gray bark irregularly divided into narrow ridges, small spreading and drooping branches, and slender reddish glabrous branchlets. Winter-buds ovate acute, from 9 to 18 millimetres long. Flowers the end of May. Fruit ripens in October.

New York: Seneca Park, Rochester, Munroe County, *B. H. Slavin*, May 17, 1910, August 13, 1911, April 8 and May 30, 1912 (No. 4, type), September 28, 1911 (No. 106); Conesus Lake, Livingston County, *J. Dunbar* (No. 57); Mendom, Munroe County, *C. C. Laney* and *R. E. Horsey* (No. 518), *R. E. Horsey*, February 21, 1913.

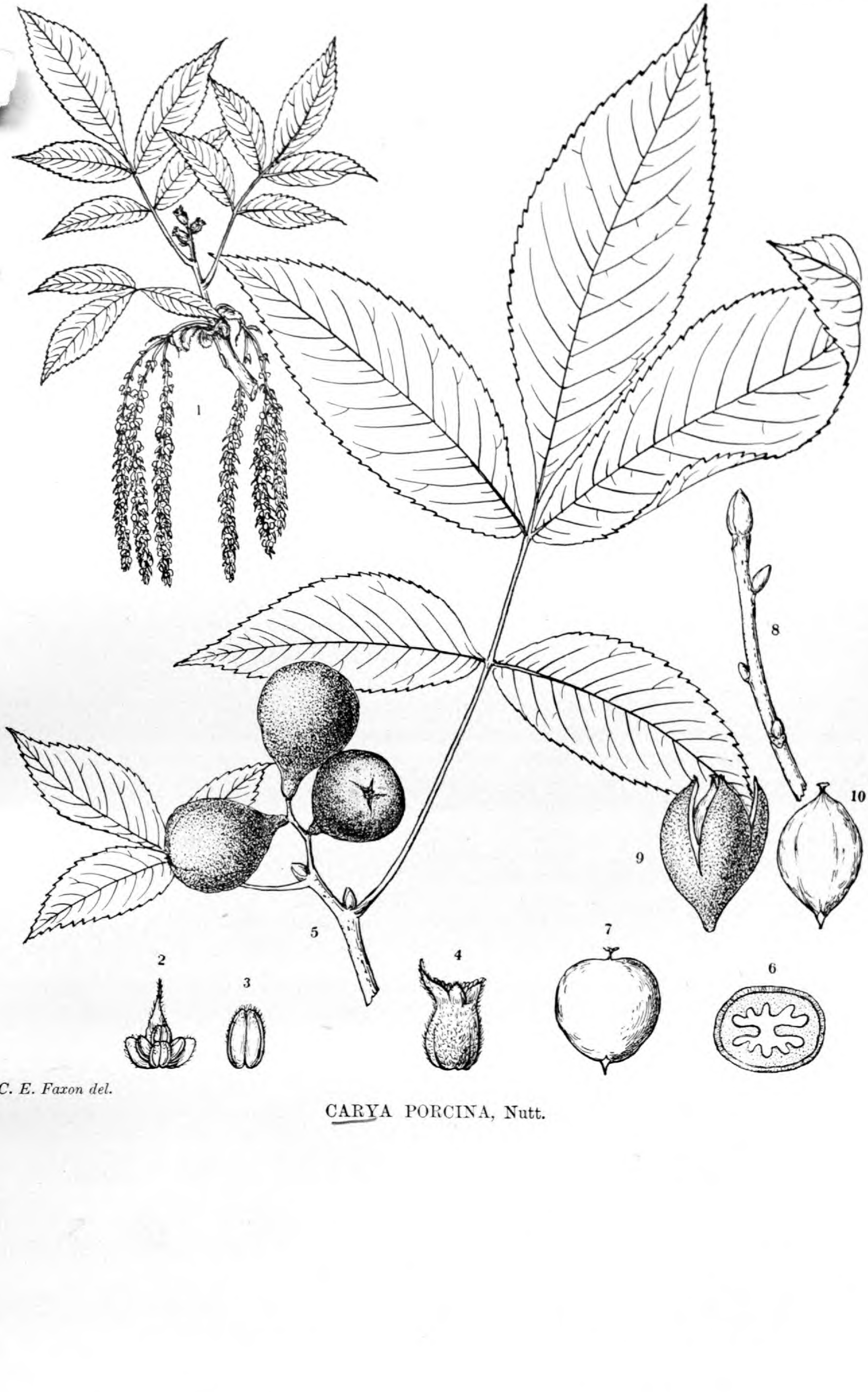
This form appears to be common in Jackson, Michigan, where it has been collected by Mr. C. K. Dodge. A specimen from Huntsville, Alabama, in the Arboretum collection, and Tracy's No. 2803 collected in Mississippi in 1894 are possibly of this variety.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXIX. CARYA PORCINA.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A stamen, enlarged.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a fruit, natural size.
7. A nut, natural size.
8. A winter branchlet, natural size.
9. A fruit of the variety *acuta*, natural size.
10. A nut of the variety *acuta*, natural size.



C. E. Faxon del.

CARYA PORCINA, Nutt.

CARYA MEGACARPA, SARG.

CARYA MEGACARPA, *n. sp.*

Leaves five-foliate, with the slender petioles from 3 to 3.5 centimetres in length; leaflets lanceolate to oblanceolate, long-pointed and acuminate at the apex, gradually narrowed and unsymmetrical at the base, finely serrate with incurved teeth, short-petiolulate; when they unfold covered below with minute yellow caducous scales, and at maturity glabrous with the exception of small axillary tufts of pale hairs, the three upper leaflets from 1.8 to 2 decimetres long and from 4 to 6 centimetres wide, and about twice as large as those of the lower pair. Aments of staminate flowers from 7 to 8 centimetres in length, slightly villose, their bracts linear, acuminate, covered with long pale hairs; bract of the flower long-pointed and acuminate, villose, twice longer than the villose calyx-lobes; stamens from four to six; anthers yellow, villose above the middle; pistillate flowers in short-stalked spikes, their involucres only slightly angled, covered with pale yellow hairs, the bract acuminate, twice longer than the bractlets and calyx-lobes. Fruit broadly obovate, rounded at the apex, abruptly cuneate below or gradually narrowed into a short stipe-like base, slightly flattened, from 2.5 to 3 centimetres long, from 2.8 to 3 centimetres wide, and from 2.5 to 2.8 centimetres thick; involucre tardily dehiscent to the middle usually by one or two, or occasionally by three, sutures, from 3 to 5 millimetres thick; nut broadest toward the rounded apex, or occasionally acute at the apex, gradually narrowed and acute at the base, compressed, more or less prominently angled, pale, from 3.5 to 4 centimetres long, from 3 to 3.5 centimetres wide, and from 2.5 to 2.8 centimetres thick, the shell from 3 to 3.5 millimetres in thickness; seeds small and sweet.

A tree, with close gray bark and comparatively stout glabrous branchlets reddish brown at the end of their first season and dark gray-brown the following year. Winter-buds ovate, acute, from 7 to 8 millimetres long and from 5 to 6 millimetres in diameter, the outer scales glabrous, the inner puberulous. Flowers in New York the last week of May; fruit ripens in October.

New York: woods, valley of the Genesee River in Seneca Park, below Rochester, Munroe County, *B. H. Slavin* (Nos. 32, type, 74, 107); Pinnacle Range, Rochester, *R. E. Horsey*, October, 1911, March, 1912 (No. 507); Ithaca, Tompkins County, *W. R. Dudley*. Illinois: Tunnel Hill, Johnson County, *B. F. Bush*, October 8, 1912. North Carolina: seashore near Wilmington, New Castle County, *C. S. Sargent*, October, 1894. South Carolina: Bluffton, Beaufort County, *C. S. Sargent*, October, 1894. Florida: Tallahassee, Leon County, Florida, *G. V. Nash*, August, 1895 (No. 2343); river bank, Palatka, Putnam County, *C. S. Sargent*, November, 1898; Eustis, Lake County, *G. V. Nash*, July, 1895 (No. 2270); Bradentown, Manatee County, *C. S. Sargent*, February 24, 1911, *J. H. Simpson*, May, 1911. Missouri: Mt. Hope Cemetery, Webb City, Jasper County, *E. J. Palmer*, October, 1911; Doniphan, Ripley County, *B. F. Bush*, and *C. S. Sargent*, October 4, 1912.

From the common form of the northern Pignut *Carya porcina*, as I understand that species, *Carya megacarpa* differs in its much larger, less flattened fruit with a thicker involucre which splits earlier and more deeply, in its larger nuts with thicker shells, stouter branchlets, and larger winter-buds. This appears to be a common southern tree, and its occurrence in western New York, where it is rare, is interesting. There are no specimens of *Carya* in the Arboretum collection from western Pennsylvania, Ohio or West Virginia, but this tree should be looked for in that part of the country and southward to the Gulf of Mexico. Pignut fruits in the Arboretum collection collected at Van Buren, Crawford County, Arkansas, by Mr. *G. M. Brown* (No. 22), which are 5 centimetres long and 4.5 centimetres wide, with an involucre 5 millimetres thick splitting nearly to the base by three sutures, are perhaps of this species, although the branchlets are puberulous and the winter-buds are smaller than those of the New York trees. C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXX. CARYA MEGACARPA.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A stamen, enlarged.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a fruit, natural size.
7. A nut, natural size.
8. A winter branchlet, natural size.

C. E. Faxon del.

CARYA MEGACARPA, Sarg.

CARYA ARKANSANA, SARG.

CARYA ARKANSANA, *n. sp.*

Leaves from five- to seven-, usually seven-foliate, from 2 to 3.5 decimetres in length, with slender petioles thickly coated when they first appear with long matted yellow hairs, becoming glabrous in early summer; leaflets lanceolate, acuminate and long-pointed at the apex, their margins thickened and serrate with small cartilaginous teeth pointing forward, the terminal leaflet acuminate and symmetrical at the base and raised on a petiole five or six metres in length, the lateral symmetrical and acuminate or unsymmetrical and rounded at the base and sessile or short-petiolulate; as they unfold thickly coated with tawny tomentum and covered with small pale scales, and at maturity thin, dark yellow-green, glabrous and lustrous on the upper surface, pale yellow-green and glabrous on the lower surface with the exception of small axillary tufts of white hairs, from 1 to 1.8 decimetres long and from 4 to 7 centimetres wide. Aments of staminate flowers from 8 to 10 centimetres in length, covered with fulvous tomentum, their bracts lanceolate, acuminate, long-pointed and villose; bract of the flower ovate, acute, covered with yellow scabrate pubescence, a third longer than the villose calyx-lobes; stamens 4; anthers ciliate at the apex, red; pistillate flowers in short-stalked spikes, their involucre only slightly angled, thickly covered with rufous tomentum mixed with white hairs, the bract acuminate, twice longer than the bractlets and calyx-lobe. Fruit obovate or ovate, rounded at the apex, abruptly or gradually narrowed at the base, yellow-brown, roughened by small excrescences and covered by small yellow scales mixed with pale pubescence, from 3.5 to 4 centimetres long and from 3 to 3.5 centimetres in diameter; involucre about 3 millimetres thick, splitting to the middle or sometimes nearly to the base by narrow-winged sutures; nut slightly obovate, rounded at the ends, compressed, slightly four-angled sometimes to the middle but usually only for about one-third of its length, pale brown, from 2.5 to 3.5 centimetres long and broad, and from 2.2 to 2.5 centimetres thick, with a short broad basal point and a hard shell from 5 to 6 millimetres in thickness, and thin deeply furrowed sweet cotyledons.[1]

A tree, sometimes from 20 to 25 metres high with a trunk 2 decimetres in diameter, covered with dark gray irregularly fissured bark separating into thin scales and from 1.5 to 3 centimetres in thickness, small branches forming a narrow head, and slender branchlets covered when they first appear with matted yellow hairs, becoming at the end of their first season brown to dark purplish gray and scurfy pubescent, and dark gray-brown and glabrous the following year. Winter buds broadly ovate, acute, about 5 millimetres long and nearly as broad, the outer bud-scales covered with small white scales, the inner with matted brown and white hairs. The wood is heavy, hard and strong, difficult to split, brown with thick nearly white sapwood; not much used except as fuel. Flowers about the first of May, fruit ripens in October.

Dry ridges and rocky hillsides on the southern slopes of the Boston Mountains in west central Arkansas and eastern Oklahoma. Arkansas: Van Buren, Crawford County, *G. M. Brown*, April, May, June and October (Nos. 14, type, 9, 20).

Among the Pignuts *Carya arkansana* is distinguished by the abundant tawny tomentum of the young leaves, by its pubescent branchlets, by the yellow scales which cover the fruit, and by the remarkably thick shell of the nut. The slender branchlets and small buds seem, in spite of the red anthers and the thick shell of the nut, to make it desirable to place it with the Pignuts rather than with the Mockernuts. C. S. S.

[1] On some trees the nuts are more gradually narrowed and slightly four-ridged at the base, the ridges running into a slender acuminate tip, the conneetive with the involucre and sometimes 6 or 7 millimetres long. The pear-shaped involucres containing nuts of this form are narrowed below into a distinct stalk-like base which surrounds the long point of the nut.

EXPLANATION OF THE PLATE.

PLATE CLXXXI. CARYA ARKANSANA.

1. A flowering branch, natural size.
2. A staminate flower, front view, enlarged.
3. A staminate flower, rear view, enlarged.
4. A stamen, enlarged.
5. A pistillate flower, enlarged.
6. A fruiting branch, natural size.
7. Cross section of a fruit, natural size.
8. A nut, natural size.
9. A winter branchlet, natural size.

C. E. Faxon del.

CARYA ARKANSANA, Sarg.

CARYA BUCKLEYI, DURAND.

CARYA BUCKLEYI, Durand, *Proc. Acad. Nat. Sci. Phila.* 1860, 547 (1861). — Young, *Bot. Texas*, 500. — Munson, *Am. Jour. Forestry*, i. 435.

CARYA TEXANA, Buckley, *Proc. Acad. Nat. Sci. Phila.* 1860, 444 (not Leconte) (1861).

Leaves seven-foliolate, from 2 to 3 decimetres long, with slender petioles scurfy pubescent and sparingly villose early in the season, soon becoming glabrous; leaflets lanceolate to oblanceolate, acuminate at the apex or the terminal leaflet sometimes broadly obovate and abruptly acuminate, the lateral leaflets more or less falcate, bluntly serrate with straight or incurved teeth, sessile or the terminal leaflet sometimes raised on a winged petiolule from 5 to 7 centimetres in length; as they unfold covered with small white scales and villose with long white hairs along the midribs below, and at maturity dark-green and glabrous or puberulous along the midribs above, and below lustrous, yellow or brown and villose on the midribs and primary veins, and furnished with small axillary tufts of pale hairs, the terminal leaflet from 1.2 to 1.5 decimetres long and from 5 to 6 centimetres wide, and about twice larger than the leaflets of the lowest pair. Aments of staminate flowers from 5 to 6 centimetres in length, pedunculate, slightly villose, their bracts lanceolate, acuminate, villose; bracts of the flowers ovate, acuminate, slightly villose, about twice as long as the villose calyx-lobes; anthers villose above the middle; pistillate flowers in short-stalked spikes, slightly angled, thickly coated with rufous hairs, the bracts acuminate, villose, two or three times larger than the bract of the flower and the calyx-lobes. Fruit subglobose to short oblong, puberulous, from 3 to 4 centimetres in diameter, the involucre from 2 to 3 millimetres thick, splitting freely to the base by slightly winged sutures; nut only slightly compressed, rounded at the base, abruptly narrowed and acute at the apex, prominently four-angled above the middle or nearly to the base, dark reddish brown and conspicuously reticulate-venulose with pale veins, from 2.5 to 3.5 centimetres in diameter, in drying often cracking longitudinally between the angles; shell hard, about 3 millimetres thick, kernel small and sweet.

A tree usually from 10 to 15 or rarely 20 metres high, with a trunk from 3 to 6 decimetres in diameter, covered with thick dark, sometimes nearly black, deeply furrowed but not scaly bark, large spreading often drooping and more or less contorted branches forming a narrow head, and slender light reddish branchlets marked by pale lenticels, and more or less densely pubescent during their first season, becoming dark gray-brown and glabrous or nearly glabrous the following year. Winter-buds ovate, brown, puberulous, covered at the apex with long pale hairs, the terminal bud abruptly contracted and long-pointed at the apex, from 1 to 1.2 centimetres long and from 6 to 7 millimetres in diameter, and two or three times larger than the flattened acute lateral buds. Flowers in April; fruit ripens in October.

Common on poor sandy uplands, growing with the Post Oak and the Black Jack, northern and eastern Texas to southern Arkansas. Texas: near Denison, Grayson County, *T. V. Munson* and *C. S. Sargent;* Jacksonville and Larissa, Cherokee County, *B. F. Bush*, October, 1909 (Nos. 5961 & 5964); near Houston, Harris County, *B. F. Bush* (No. 1596). Arkansas: Fulton, Hempstead County, *B. F. Bush*, October 4, 1909 (No. 5931).

This tree, which is intermediate in character between the Pignuts and the Mockernuts, has been entirely overlooked for many years, and the name has not appeared in any of the recent works on botany owing, perhaps, to the fact that the name *Carya texana* had been used by another author for an entirely different species before Buckley applied it to this

tree; and it is due to the late Thomas Volney Munson (1844–1913), the distinguished viticulturist of Denison, where it is very common on his land south of the city, that it is now possible to add it to the Silva of North America.[1]

[1] NOTES ON HICKORIES.

CARYA TEXANA, Leconte.

This species, known formerly only from the valley of the Brazos River in Texas, has been found by Mr. George M. Brown on the Arkansas River near Van Buren in the extreme western part of the state of Arkansas, and by Mr. G. H. Kellogg at Arkansas Post at the mouth of the river. This interesting tree probably occurs therefore at other places on the Arkansas River, in Oklahoma and Arksanas, and southward to Texas.

CARYA CORDIFORMIS, Wangenheim (*Hicoria minima* of Sargent's *Silva N. Am.* & *Manual of the Trees of N. Am.*).

A form of this tree with broad leaflets may be distinguished as —

Var. LATIFOLIA, *n. var.*

Leaves from seven- to nine-foliate, from 2.5 to 4 decimetres long, with slender petioles pubescent early in the season, becoming glabrous; leaflets oblong-obovate to oval, acute, acuminate or rounded at the apex, coarsely serrate, villose above and hoary-tomentose below when they unfold, at maturity thin, yellow-green and nearly glabrous on the upper surface, pale and somewhat pubescent on the lower surface, the terminal leaflet acuminate and symmetrical at the base and often from 2.5 to 3 decimetres long and 1 decimetre wide and raised on a petiolule from 1 to 1.2 centimetres in length, the lateral leaflets broad, rounded and unsymmetrical at the base, short-petiolulate, those of the upper pair often 1 decimetre long and from 7 to 10 centimetres wide, those of the other pairs gradually decreasing in size, the lowest not more than 7 centimetres long and from 4 to 5 centimetres wide. Aments of staminate flowers from branches of the year and of the previous year, pedunculate. Fruit subglobose but sometimes a little longer than thick, 1.5 centimetres in diameter, opening by narrow winged sutures to the middle; nut rounded at the ends, distinctly four-lobed, especially at the base, slightly ridged below the apex between the lobes, puberulous, from 1.6 to 1.8 centimetres in diameter.

A tall tree in woods, with close pale bark and slender orange-colored branchlets.

Missouri: Monteer, Shannon County, *B. F. Bush*, May 14, 1901 (No. 457), August5, 1910 (No. 6094), October 10, 1910 (No. 6407); Webb City, Jasper County, *B. F. Bush*, October 10, 1909 (No. 5997); Oronoyo, Jasper County, *E. J. Palmer*, July 10, 1910 (No. 2994); Noel, Macdonald County, *B. F. Bush*, August 11, 1908 (No. 561), May 26, 1909 (No. 5751), October 8, 1909 (No. 5990), *E. J. Palmer*, May 8 and October 23, 1910 (Nos. 2919, 2950, 3291, 3292, type). Oklahoma: Sapulpa, *B. F. Bush*, May 6, 1895 (No. 1139). Arkansas: Van Buren Connty, *G. M. Brown*, April 19, 1909 (No. 2). Texas: Marshall, Harrison County, *C. S. Sargent*, April 19, 1901, *B. F. Bush*, August 9, 1901 (No. 651). Georgia: Rome, Floyd County, *T. G. Harbison*, September and October, 1910 (Nos. 148, 231). West Virginia: *J. K. Small*, Marion, Smythe County, August 2, 1892; Cheat River valley, *A. Rehder*, August 23, 1907 (in rich woods). Ontario: Point Pelée, Essex County, *C. K. Dodge*, August, 1910.

The leaves of the extreme form of this variety look very unlike the leaves of the common form of the Bitternut, with leaflets not more than 2 centimetres wide, but trees with leaflets varying from narrow to the broadest of this variety occur in different parts of the country. The pubescence of the variety is much denser than that on the common Bitternut, but the pubescence of this species varies greatly on different individuals and cannot be depended on as a specific or varietal character. The lobed and puberulous nuts from the trees at Noel are unlike those of *Carya cordiformis*, and if it is found that the trees with the broad leaflets always produce nuts of this character it may be desirable to consider this as a distinct species.

CARYA ALBA, K. Koch.

Two unusual forms of the Mockernut may be distinguished: —

CARYA ALBA, var. FICOIDES, *n. var.*

Leaves seven-foliate, the leaflets oblong-lanceolate, long-pointed and acuminate at the apex, the terminal leaflet acuminate also at the base, the lateral leaflets unsymmetrical at the base, cuneate on one side and rounded on the other. Fruit obovate, narrowed and rounded at the apex, gradually contracted below into a thick short stipe-like base, smooth and lustrous, becoming mahogany color in drying, from 5.5 to 6 centimetres long and about 3.5 centimetres in diameter; involucre from 8 to 9 millimetres thick, splitting tardily to the base by one suture, the others opening usually for less than one-third of their length; nut acuminate at the ends, compressed, prominently four-angled to below the middle or nearly to the base, light-colored, from 4 to 4.5 centimetres long, 2.5 centimetres wide and 2 centimetres thick, the shell from 2.5 to 3 millimetres in thickness; seed comparatively large, of good flavor.

A large tree, with pubescent winter branchlets and ovate acute pubescent winter-buds about 1.2 centimetres long and 7 millimetres in diameter.

Sandy soil in Mt. Hope Cemetery, Webb City, Jasper County, Missouri, *E. J. Palmer* and *C. S. Sargent*, October 8, 1911 (No. 3493), *E. J. Palmer*, October, 1912, February, 1913.

The fruit of this tree might readily be taken for a gigantic Pignut, but the foliage and its pubescence are clearly those of *Carya alba*. Acuminate nuts are not rare in this species, but the nuts of this variety are unusually light-colored and their shells are remarkably thin. The pubescence on the branchlets is similar to that usually found on the branchlets of the Mockernut, but the buds are smaller than those of that tree. In the Arboretum collection are fruits collected in Allenton, Missouri, by Mr. G. W. Letterman in 1904 which are identical in size, shape and color with those of the Webb City tree. These nuts are acuminate at the ends, rather less prominently ridged and of the usual reddish color assumed by the nuts of *Carya alba* in drying, and their

shell is much thicker than that of the Webb City tree. In spite of these differences the Allenton tree should, I think, be referred to this new variety.

CARYA ALBA, var. SUBCORIACEA, *n. var.*

Leaflets subcoriaceous, densely stellate-pubescent on the lower surface and sparingly stellate-pubescent on the upper surface through the season, with long white hairs on the lower side of the midribs as the leaves unfold, the terminal leaflets and those of the upper pair often from 1.8 to 2 decimetres long and from 8 to 9 centimetres wide. Fruit oblong, strongly angled, the involucre from 7 to 8 millimetres thick, splitting freely to the base; nut oval, prominently angled, gradually narrowed and long-pointed at the apex, and rounded at the broad base or abruptly narrowed at the ends and rounded at the base and pointed at the apex.

Coast of Virginia and southern Missouri southward to Florida and eastern Texas.

This is a common form of the Mockernut in this region, differing from the northern tree in its larger, thicker and more pubescent leaflets usually yellow on the lower surface, larger and usually more prominently angled fruit with a thicker involucre, larger nuts and larger winter-buds up to 2 centimetres long and 1.4 centimetres in diameter.

In southern Arkansas, where it is very common, and grows to a large size, this is the only form of the Mockernut, and southern Arkansas may be considered the type region of the variety. Fulton, Hempstead County, *B. F. Bush* (No. 5939, type).

Two forms of *Carya ovata* may be distinguished: —

CARYA OVATA, var. FRAXINIFOLIA, *n. var.*

Leaves five-foliolate; leaflets lanceolate to slightly oblanceolate, acuminate, thick and firm in texture, lustrous above, pubescent along the midribs below, the terminal 1.4 or 1.5 decimetres long, from 4.4 to 5 centimetres wide, and raised on a slender puberulous petiolule, the lateral leaflets unsymmetrical at the base, sessile, those of the lowest pair from 7 to 9 centimetres long and from 2.5 to 3 centimetres wide. Fruit, short-oblong, pointed at the apex, compressed, about 3 centimetres long, the involucre splitting freely to the base, from 4 to 5 millimetres thick; nut much compressed, rounded at the ends, prominently angled, about 2.5 centimetres long, 2.2 centimetres wide, and 1.5 centimetre thick; on some individuals fruit slightly obovate with the nut long-pointed at the apex and occasionally from 2.3 to 3 centimetres long, from 1.6 to 2.4 centimetres wide, and from 1 to 1.6 centimetres thick.

A large tree, with bark separating in loose plates, and slender glabrous or puberulous branches.

New York, not rare: near Conesus Lake, Livingstone County, *J. Dunbar*, September 14, 1911, April 17 and June 4, 1912 (No. 29, type), September 13, 1911 (Nos. 1 and 25); Mt. Morris, Livingstone County, *J. Dunbar*, September 16, 1911 (Nos. 52, 53, 58); Macedon, Wayne County, *B. H. Slavin*, September, 1911 (Nos. 61 and 98); Indian River, Lewis County, *J. McHugh*, September 13, 1911 (Nos. 3, 12, 13, 16, 17, 18, 25–28); Canandaigua, Ontario County, *B. H. Slavin*, September 20, 1911 (Nos. 80, 83, 85, 86); Rochester, Munroe County, *B. H. Slavin*, September, 1911 (Nos. 61, 105).

This variety has smaller fruit than the common forms of *Carya ovata*, and it is usually pointed and not depressed at the apex. The involucre is softer and more spongy, a character which disappears in drying, and the nuts although smaller show the usual variations in shape found in those of the Shagbark. The branchlets on some trees are glabrous and on others pubescent, as on the common forms of the species, but the buds are generally rather smaller. The constantly narrow lanceolate leaflets are the only character therefore by which this variety can be distinguished. They give to the tree a very distinct appearance and make it possible to recognize it at a distance from other Shagbark Hickories.

CARYA OVATA, var. NUTTALLII, *n. var.*

Carya microcarpa, Nuttall, *Silva N. Am.* i. 39, t. 13 (not *Carya microcarpa*, Nuttall, *Gen.* ii. 221) (1842).

I suggest this name for the small-fruited Shagbark which Nuttall appears to have confounded with his *Carya microcarpa*, for although the description in his Silva perhaps refers, at least in part, to one of the forms of *Carya ovalis*, his figure represents that of the fruit of a small Shagbark, and Nuttall's specimen of the nut of *Carya microcarpa* preserved in the Academy of Natural Science at Philadelphia is a small Shagbark exactly like the nut which he figured in his Silva.

The nut of this variety is rounded, obcordate or rarely pointed at the apex, rounded or abruptly pointed at the base, much compressed, prominently angled, about 1.5 centimetres long and from 1 to 1.2 centimetres thick; the involucre is from 4 to 10 millimetres thick and splits freely to the base. Except in the size of the fruit there appear to be no characters by which this variety can be distinguished from the common Shagbark. I have seen specimens of the variety from eastern Massachusetts, eastern Pennsylvania, western New York, and from near Allenton, Missouri.

CARYA OVALIS, *n. nom.*

Juglans ovalis, Wangenheim, *Nordam. Holz.* 24, t. 10, f. 23 (1787).

This appears to be the oldest name of one of the most widely and generally distributed and most variable in its fruit of all Hickory trees. It is one of the tallest of the species too, sometimes reaching a height of at least thirty-five metres, with a trunk often one metre in diameter and covered with pale gray bark, sometimes but not always separating into small plate-like scales, small branches forming a narrow pyramidal head, slender branchlets scurfy-pubescent when they first appear and ovate obtuse or acute winter-buds from 5 to 10 millimetres long. The leaves are five- or rarely seven-foliolate with slender petioles often scurfy-pubescent early in the season or glabrous, and the leaflets are lanceolate to oblanceolate, long-pointed and acuminate at the apex, cuneate and unsymmetrical at the base, finely serrate, scurfy-pubescent and often furnished early in the season with small axillary tufts of pale hairs, becoming glabrous, the lateral sessile or short-petiolulate, the terminal raised on a stalk sometimes 1.5 centimetres in length.

In the shape of the fruit and in the thickness of its involucre this tree is of four distinct forms; in all of them the involucre splits freely to the base, or nearly to the base, the shell of the nut is thin and the seed, although small, is sweet and edible. The

extremes of these forms are very distinct, but there are forms which are intermediate between them, so that it is difficult to decide sometimes to which of the forms these intermediate forms should be referred. The first of these forms, as the fruit agrees with Wangenheim's figure, must be considered the type of the species. The fruit is oval, narrowed and rounded at the base, acute at the apex, usually from 2.5 to 3 centimetres long and about 1.5 centimetres in diameter. The involucre is from 2 to 2.5 millimetres thick and occasionally one of the sutures remains closed. The nut is oblong, slightly flattened, rounded at the base, acute or acuminate and four-angled at the apex, the ridges extending for one-third or rarely for one-half of its length, from 2 to 2.5 centimetres long and about 1.5 centimetres in diameter. The shell is usually about 1 millimetre thick. This description is taken from the fruit of a tree growing on Collin Brook in Delaware County, Pennsylvania. Trees with fruit of this form appear to be rare, and I have only seen specimens of the Collin Brook tree and of one from Haverford, also in Delaware County, from Staten Island, Mt. Morris and Rochester, New York, Great Falls, District of Columbia, Highlands, North Carolina, Missionary Ridge near Chattanooga, Tennessee, Thompson, McDuffee County, Georgia (coll. *H. H. Bartlett*), Olney, Illinois, Allenton and Webb City, Missouri. On the Staten Island, Missionary Ridge and Allenton trees the nuts are less pointed than on the others. The description and figure of *Hicoria microcarpa* in Britton & Brown's *Illustrated Flora of the Northern States and Canada* (i. 486, f. 1157), and reproduced with the same name in Britton & Shafer's *N. Am. Trees* (236, f. 193), seems to represent the type of *Carya ovalis*.

For a variety with globose or nearly globose or short-oblong fruit and angled nuts I think it will be safe to take up Muehlenberg's name of *obcordata*, as it is the only variety with nuts which are sometimes distinctly obcordate, although this is by no means a constant character. This form is common in the region best known to Muehlenberg. The synonymy of this variety is then, —

CARYA OVALIS, var. OBCORDATA, *n. var.*

Juglans obcordata, Muehlenberg & Willdenow, *Neue Schrift. Gesell. Nat. Fr. Berlin*, iii. 392 (not Poiret) (1801). — Willdenow, *Spec.* iv. 458.

Juglans porcina, *α obcordata*, Pursh, *Fl. Am. Sept.* ii, 638 (1814). — W. P. C. Barton, *Compend. Fl. Phila.* ii. 180. — Watson, *Dendr. Brit.* ii. 167, t. 167.

Carya microcarpa, Nuttall, *Gen.* ii. 221 (in part) (1818).

Carya porcina, Spach, *Hist. Vég.* ii. 178 (not Nuttall) (1834).

Carya microcarpa, Darlington, *Fl. Cestr.* ed. 3, 264 (in part) (not Nuttall) (1853). — Chapman, *Fl.* 419. — C. De Candolle, *Prodr.* xvi. pt. ii. 143. — Gray, *Man.* ed. 5, 448.

Hicoria microcarpa, Britton, *Bull. Torrey Bot. Club.* xv. 283 (1888).

Hicoria glabra, var. *odorata*, Sargent, *Silva N. Am.* vii. 167 (in part), t. 354, f. 5, 6, 7, 9 (1895).

This is the most widely and probably the most generally distributed variety. It is common in southern New England and ranges westward to Wisconsin, southwestern Missouri and eastern Kansas, and southward to Mississippi. The fruit varies from subglobose to short-oblong or to slightly obovate, showing a tendency to pass into that of the other varieties of the species. It varies from 2 to 3 centimetres in diameter, and the involucre, which is from 2 to 5 millimetres thick, splits freely to the base or nearly to the base by narrowly winged sutures, one of them rarely extending only to the middle of the fruit. The nut is usually much compressed, often broadest above the middle, slightly angled sometimes to below the middle, rounded at the base and rounded and often more or less obcordate at the apex. The largest fruit I have seen of this form is from Webb City, Jasper County, Missouri (*E. J. Palmer*, No. 3500). The nuts are 2.4 centimetres long and wide and 2 centimetres thick, rounded at the ends and very slightly ridged. The walls are thin and the seed correspondingly large. The leaves of this tree are seven-foliolate. It was this form probably which was considered by Audubon to be the Pig Nut Hickory; see his *Birds of America*, p. 465, t. 91; ed. octavo i. t. 10.

For the third form perhaps can be taken Marshall's name of *odorata*, although it is probable that he included in it some of the other forms, which all grow in eastern Pennsylvania. The name, however, may have been given by him to this variety on account of the strong resinous odor of the inner surface of the fresh involucre of the fruit, which I have not noticed in that of the other forms. The fruit is subglobose or sometimes slightly longer than broad, flattened and usually from 1.3 to 1.5 centimetres in diameter. The involucre varies from 1 to 1.5 millimetres in thickness and splits freely to the base by distinctly winged sutures. The nut is rounded or acute at the base with a short point, rounded at the apex, very slightly or not at all ridged, pale colored, from 1.2 to 1.5 centimetres long and wide and from 1 to 1.2 centimetres thick. The synonymy of this variety is, —

CARYA OVALIS, var. ODORATA, *n. nom.*

Juglans alba odorata, Marshall, *Arbust. Am.* 68 (1785).

Carya microcarpa, Darlington, *Fl. Cestr.* ed. 3, 264 (in part). Gray, *Man.* ed. 5, 448 (in part).

Hicoria microcarpa, Britton, *Bull. Torrey Bot. Club.* xv. 283 (in part) (1885).

Hicoria glabra, var. *odorata*, Sargent, *Silva N. Am.* vii. 167 (in part), t. 354, f. 8 (1895).

The fruit of this variety shows less tendency to vary than that of any of the others, and it may sometime be considered a species. I have seen, however, in Delaware County, Pennsylvania, large trees of this variety and of the variety *obcordata* standing side by side and so exactly alike in habit, branches, bark, foliage and winter-buds that it was impossible to distinguish them except by the larger and smaller fruits with thicker odorless and with thinner fragrant involucres and by the larger and smaller nuts.

This variety appears to be less generally distributed than the others, and I have seen it only from Bridgeport, Connecticut, in western New York where it is common, in Delaware County, Pennsylvania, Wells County, Indiana, at Mount Carmel, Wabash County, Illinois, and at Allenton, St. Louis County, Missouri.

In the fourth form the fruit is more or less obovate, about 2.5 centimetres long and 2 centimetres in diameter, and the involucre varies from 2 to 4 millimetres in thickness. The nut is much compressed, pointed or rounded at the apex, rounded at the base, usually about 2 centimetres long, nearly as broad, and about 1.5 centimetres thick. I propose for it the name of —

CARYA OVALIS, var. OBOVALIS, *n. var.*

I have seen specimens of this form from Petersham, Massachusetts, Bridgeport, Connecticut, Delaware County, Pennsylvania, Gloucester County, Virginia, western New York, and Allenton, Missouri. It is figured as *Carya glabra* in *The Silva of North America* (vii. t. 353, f. 1, 3, 4, 5) from a specimen from Allenton. This is the common Pignut in many parts of the middle western states.

Hicoria borealis Ashe is probably a form of this species, but I have seen only a single tree on Belle Isle in the Detroit River, Michigan, and I have been unable to learn if this is the type station. The Belle Isle tree has scaly bark and ovoid or oval flattened fruit with an involucre from 3 to 3.5 millimetres thick, dehiscent by very narrowly winged sutures extending to the base; it is about 2.5 centimetres long and broad and 2 centimetres thick; the nut is slightly ovate or oval, rounded at the ends, conspicuously ridged to the base with slender ridges, about 2 centimetres long and wide and 1.5 centimetre thick, with a pale shell 1 millimetre or less in thickness and a sweet seed. If these characters are constant on other trees this might be called —

CARYA OVALIS, var. BOREALIS, *n. var.*

Hicoria borealis, Ashe, *Notes on Hickories* (1896). — Britton & Brown, *Ill. Fl.* iii. 512, f. 1156b. — Britton, *Man.* 325. — Britton & Shafer, *Trees N. Am.* 236, f. 194.

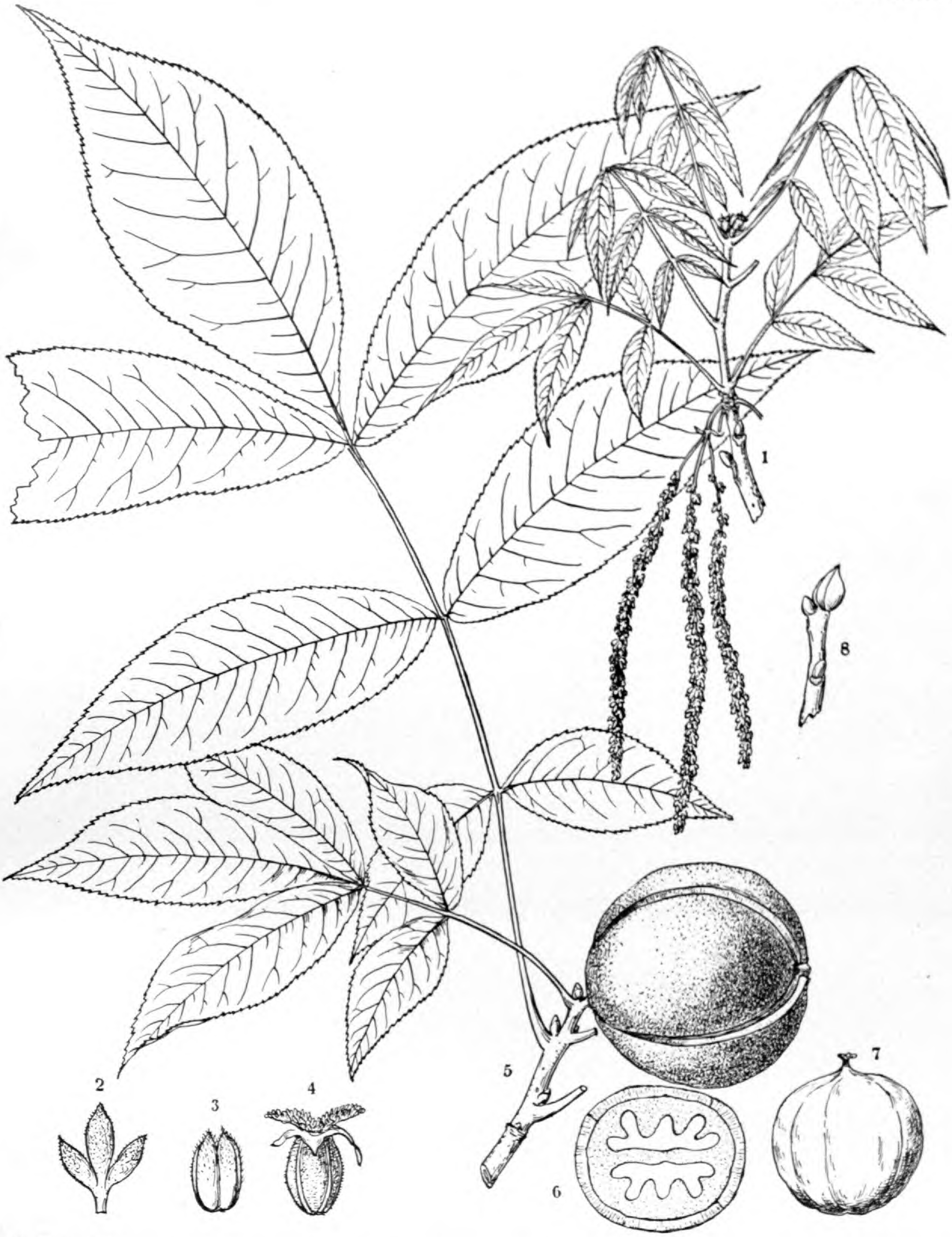
Carya borealis, C. K. Schneider, *Ill. Handb. Laubholzk.* i. 803 (1906).

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXXII. CARYA BUCKLEYI.

1. A flowering branch, natural size.
2. A staminate flower, rear view, enlarged.
3. A stamen, enlarged.
4. A pistillate flower, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a nut, natural size.
7. A nut, natural size.
8. A winter branchlet, natural size.



C. E. Faxon del.

CARYA BUCKLEYI, Durand

POPULUS SARGENTII, DODE.

POPULUS SARGENTII, Dode, *Extr. Monogr. Ined. Populus*, 40 (1905). — Britton & Shafer, *N. Am. Trees*, 178, f. 136.

POPULUS ANGULATA, Porter & Coulter, *Fl. Colorado; Hayden's Surv. Misc. Pub.* No. 4, 129 (not Aiton) (1874).

POPULUS DELTOIDEA, Sargent, *Silva N. Am.* ix. 179 (in so far as relates to the Rocky Mountains, not Marshall) (1896).

POPULUS DELTOIDES OCCIDENTALIS, Rydberg, ex Britton, *Man.* ed. 2, 310 (1905).

POPULUS OCCIDENTALIS, Rydberg, *Bull. C. Agric. Exper. Stat. Colorado*, 91 (*Fl. Colorado*) (1906). — Nelson, Coulter, *Man. Rocky Mt. Bot.* ed. 2, 128.

Leaves often broader than long, ovate, abruptly narrowed into long slender acuminate entire points, or rarely rounded at the apex, truncate or slightly cordate at the base, coarsely crenately toothed; when they unfold slightly villose above and tomentose on the margins, soon becoming glabrous, light green and very lustrous, from 7 to 8 centimetres long and from 9 to 10 centimetres wide, with thin midribs, slender primary veins and reticulate veinlets, occasionally furnished on the upper side at the insertion of the petioles with one or two small glands; petioles slender, laterally compressed, glabrous, from 6 to 9 centimetres in length. Flowers in the axils of scarious light brown scales fimbriately divided at the apex, the staminate in short-stalked glabrous aments from 5 to 6 centimetres long, the pistillate becoming from 1 to 1.2 decimetres in length at maturity; disk of the staminate flower broad, oblique, slightly thickened on the margins; stamens twenty or more, with short filaments and yellow anthers; disk of the pistillate flower cup-shaped; ovary subglobose, crowned with three or four sessile dilated or laciniately lobed stigmas. Fruit oblong-ovate, gradually or abruptly narrowed to the blunt apex, about 1 centimetre long and 3 or 4 times longer than the pedicel; seeds oblong-obovate, rounded at the apex, about 1.5 millimetres in length.

A tree, from 20 to 30 metres high, with a trunk covered with thick pale bark divided by deep furrows into broad ridges, large, erect and spreading branches forming a broad open head, and stout glabrous light yellow branchlets conspicuously roughened by the elevated scars of fallen leaves. Winter-buds ovate, acute, their scales light orange-brown and puberulous.

This is the common Cottonwood of riverbanks in the eastern foothill region of the Rocky Mountains from Saskatchewan to New Mexico, ranging east to Dakota, Nebraska, western Kansas (Atwood, Rawlins County, in *Herb. Mo. Bot. Gard.*) and to western Texas.[1] It is very common and the only broad-leaved Cottonwood in central Colorado, where it is much planted as a shade tree. Long confounded with *Populus deltoidea* Marshall, the Cottonwood of the eastern states, this tree was first distinguished by Professor William Trelease in his unpublished study of the North American Poplars as var. *intermedia* in Herb. As he pointed out, it can be distinguished from the eastern tree by the pale yellow color of the branches, by the pubescent buds, by the much shorter pedicel of the female flower and fruit, and by the larger and fewer teeth of the leaves.[2]

[1] The eastern range of this tree and the western range of *Populus deltoidea* have not yet been satisfactorily established.

[2] NOTES ON POPULUS.

There is a Poplar cultivated in Germany as *Populus angulata* which has the scales of the inflorescence crenate, not laciniately divided, at the apex, and leaves similar to those of *Populus deltoidea* (see C. K. Schneider, *Ill. Handb. Laubholzk.* i. 9, f. 1, o–p, f. 3, q–r. A careful examination of the Poplars growing in many parts of the eastern states has failed to locate a tree of this character. The tree which is sometimes found in English collections as *Populus angulata* also is not known in a wild state in this

country. It has thick, oblong-ovate, acute or acuminate glabrous leaves, rounded and sometimes oblique at the base, finely serrate with numerous teeth, and often from 1 to 1.2 decimetres long, and from 8 to 10 centimetres wide, with usually red midribs, veins and petioles. The fact that this tree is not always perfectly hardy in England would indicate its southern origin.

Aiton's specimens, however, of *Populus angulata* are preserved in the British Museum, and well represent the Cottonwood of the Ohio valley, the lower Mississippi valley, and the south Atlantic and Gulf States, where the younger Michaux found what he considered *Populus angulata*. This southern tree is distinguished from the northern Cottonwood by the deciduous hairs which cover the upper surface of the young leaves and by the pubescence on their lower surface, which is more or less present during the season, especially on the midribs and veins. The leaves are sometimes rather larger than those of the northern tree; but this is perhaps due to the rich soil of the southern river bottoms, and vigorous branches are as often angular on northern as on southern trees; I suggest for the southern tree the name of —

POPULUS DELTOIDEA, var. ANGULATA, *n. var.*

Populus angulata, Aiton, *Hort. Kew.* iii. 407 (1789). — Michaux f. *Hist. Arb. Am.* iii. 302, t. 12. — Chapman, *Fl.* 431.
Populus deltoidea, Sargent, *Silva N. Am.* ix. 179 (in so far as relates to the southern states, not Marshall) (1896).

This is the common Cottonwood of all the regions south of the Potomac and Ohio Rivers, ranging to the southwest as far a least as the neighborhood of San Antonio, Texas. It is common on the banks of the Potomac River in Washington, where Tide strom (*Clusium marianum*, 17) says that he has observed *Populus virginiana*, although he says nothing about the pubescence whic is well developed on these Potomac trees. *Populus virginiana* Fougeroux is an older name than *Populus angulata*, but Fougeroux gives no real description of his species, and it is impossible to determine his tree, although his name has been taken up by both Dode and Tidestrom. Of Tidestrom's specimens in the Herbarium of the Arnold Arboretum, No. 4699 from Glen Echo, Maryland, in the valley of the Potomac River, has the pubescent leaves of *P. deltoidea* var. *angulata*, but No. 4556 from the same locality and No. 4694 from High Island in the valley of the Potomac have the leaves perfectly glabrous.

Populus deltoidea (*canadensis*) of German dendrologists (not *P. canadensis* of Michaux) (see C. K. Schneider, *Ill. Handb. Laubholzk.* iii. 7, f. 1, d–f, f. 3, o–p[1]) is another tree which we have been unable to find growing naturally in any part of the United States. The leaves are described as glabrous on the margins, and at the base of the shoots they are cuneate. The ovaries are three-celled with spreading stigmas. The female flowers of *Populus monilifera* as cultivated in Germany are described as with a pointed two-celled ovary and erect stigmas, and this tree is considered distinct from *P. deltoidea* (see Schneider, *Ill. Handb. Laubholzk.* i. 7, f. 1, a–c, f. 3, n–n[2]). In all the flowers of wild trees we have been able to examine the ovaries are three- or four-celled with spreading stigmas; and in all of eastern North America we have been able to find only one Cottonwood with leaves which are truncate or subcordate at the base, glabrous in the north and pubescent in the south.

The Poplar which has for several years been largely planted as a street tree in the United States is believed to be a hybrid of European origin between the northern Cottonwood of the United States and the so-called Lombardy Poplar. It is a tree with rather a narrow head of semierect branches and leaves which are cuneiform or rounded at the base. Only the staminate tree is known. The name of this hybrid appears to be —

POPULUS EUGENEI, Hort. ex Dode, *Extr. Monog. Ined. Populus*, 46 (1905). — C. K. Schneider, *Ill. Handb. Laubholzk.* i. 9.
Populus canadensis Eugenei, Schelle, Beissner, Schelle & Zabel, *Handb. Laubholzk.* 16 (1903).

Populus Eugenei sprang up many years ago in the nurseries of Simon-Louis Frères at Plantières near Metz, in Alsace. It is hardly possible that all the cultivated trees of this hybrid are descended from the single individual at Plantières, and it is probable that other individuals of the same parentage varying somewhat among themselves in habit and foliage have been propagated by nurserymen. Poplar trees apparently of the same origin have been much planted in Europe, where they are generally known as the Swiss Poplar and as the Black Italian Poplar, and it is probably this tree which Lamarck described under the name of *Populus nigra helvetica* (*Dict.* v. 234 [1834]). In the United States this hybrid is usually called Canadian Poplar or Cottonwood.

Two other hybrid Poplars may be described as —

POPULUS JACKII, *n. hyb.*
(*Populus balsamifera* × *deltoidea.*)

Leaves ovate, gradually narrowed, long-pointed and acuminate at the apex, rounded, slightly cordate or occasionally abruptly cuneate at the base, finely crenately serrate, glabrous, dark green and lustrous on the upper surface, pale and lustrous on the lower surface, from 7 to 8 centimetres long and from 6 to 7 centimetres wide; on vigorous shoots usually cordate at the base silvery white on the lower surface and often 1.5 decimetres long and from 1.2 to 1.4 decimetres wide; petioles slender, compressed laterally, from 4 to 5 centimetres in length. Flowers and fruits not collected.

A tree, with slender slightly angled branchlets and narrow acuminate resinous buds.

A single large tree on Nuns' Island, at the mouth of the Chateaugay River, Province of Quebec, *J. G. Jack*, August 24, 1889, August 4 and 20, 1902, August 11, 1909, September 16, 1911; also a small tree on the south bank of the St. Lawrence River at Beauharnois, Province of Quebec, *J. G. Jack*, August 9, 1908. These trees show the influence of *Populus balsamea* in the pale or silvery under surface of the finely serrate leaves and in the buds, and the influence of *P. deltoidea* in the broad leaves. It is established in the Arnold Arboretum.

POPULUS ANDREWSII, *n. hyb.*
(*Populus acuminata* × *Sargentii.*)

Leaves oblong-ovate, gradually or abruptly long-pointed and acuminate at the apex, rounded or occasionally abruptly cuneate at the broad base, finely crenately serrate except at the very apex, thin, bright green and lustrous above, rather paler below, from

9 to 10 centimetres long and from 6 to 7 centimetres wide; petioles slender, nearly terete, from 3.5 to 4 centimetres in length. Flowers and fruit not seen. Branchlets light orange-brown; winter-buds acuminate, covered with resin.

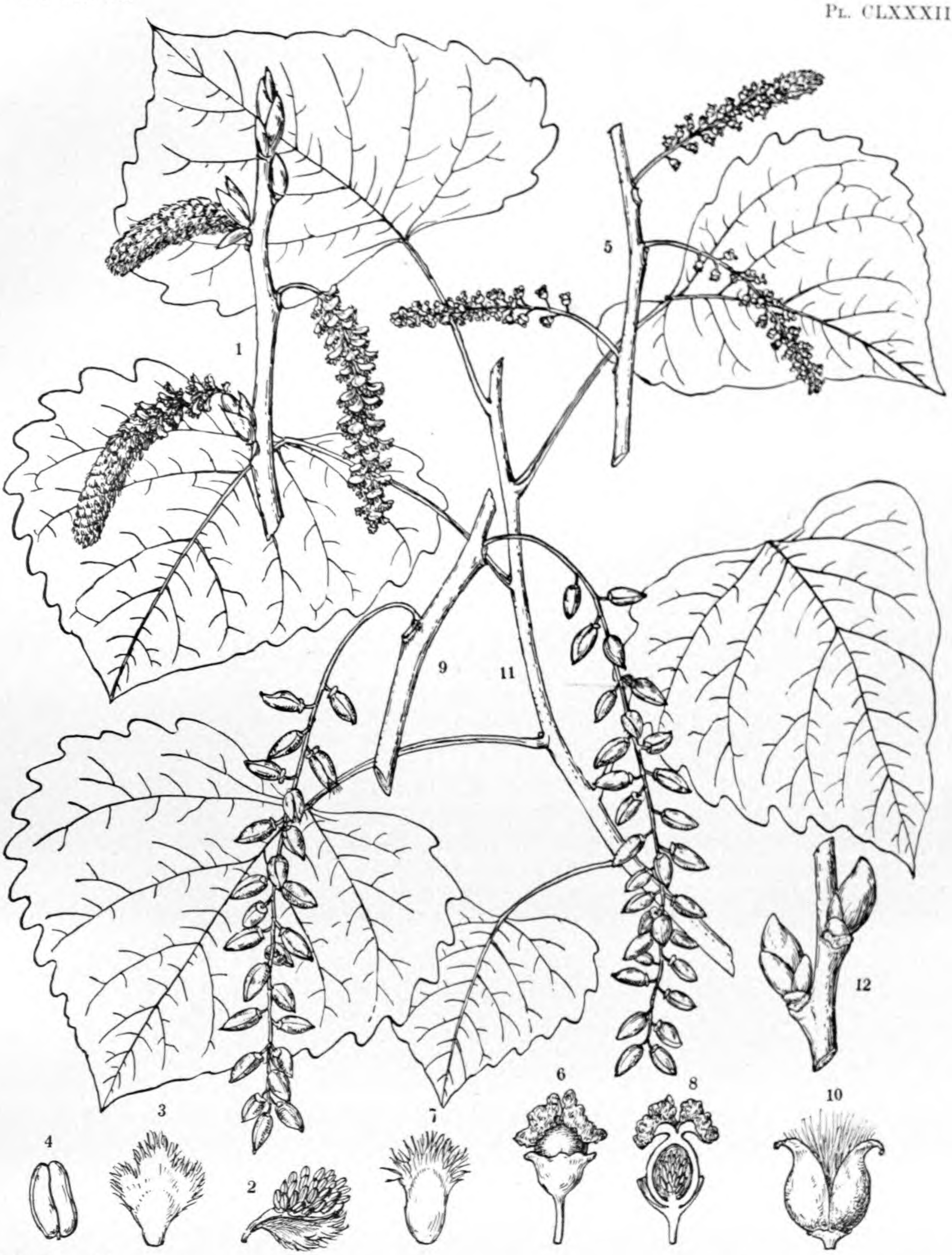
A small tree in Mr. E. H. Andrews's nursery at Boulder, Colorado, raised from cuttings from a tree found by him near Boulder, Boulder County. A large tree, growing naturally at Walsenberg, Huerfano County, Colorado, shown to me by Mr. E. Bethel of Denver, is evidently of the same parentage, as both *Populus acuminata* and *Populus Sargentii* were growing with it. The leaves of this tree are somewhat more coarsely serrate than those of the Boulder tree, and are sometimes 1.2 to 1.5 decimetres long and 1 decimetre wide; and at the ends of vigorous shoots they are often cuneate at the base, showing the influence of *Populus acuminata*. These trees resemble *Populus acuminata* in the texture of the leaves and in their finer and numerous serratures, while *Populus Sargentii* appears in the broad leaves with wide bases, and in the color of the branchlets, which are much darker than those of *Populus acuminata*.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXXIII. POPULUS SARGENTII.

1. A flowering branch of the staminate tree, natural size.
2. A staminate flower, enlarged.
3. A scale of a staminate flower, rear view, enlarged.
4. A stamen, enlarged.
5. A flowering branch of the pistillate tree, natural size.
6. A pistillate flower, enlarged.
7. A scale of a pistillate flower, enlarged.
8. A vertical section of a pistillate flower, enlarged.
9. A fruiting branch, natural size.
10. A fruit, enlarged.
11. A branch, with leaves, natural size.
12. A winter branchlet, natural size.



C- E. Faxon del.

POPULUS SARGENTII, Dode

SALIX WRIGHTII, ANDERSS.

SALIX WRIGHTII, Andersson in *Öfvers. Vetensk. Akad. Förhandl.* xv. 114 (*Bidr. Nordam. Pilarter*, 115 (1858); in *Proc. Am. Acad.* iv. 53. — Britton & Shafer, *N. Am. Trees*, 185, f. 142 (1908).

LIX NIGRA, *subspec.* WRIGHTII, Andersson, *Svensk. Vetensk. Akad. Handl.* ser. 4, vi. 22 *Monographia Salicum*); De Candolle, *Prodr.* xvi. pt. ii. 201. — Bebb, *Bot. Gazette*, xvi. 102. — oulter, *Contrib. U. S. Nat. Herb.* ii. 419 (*Man. Pl. W. Texas*).

SALIX OCCIDENTALIS, *var.* LONGIPES, Sargent, *Silva N. Am.* ix. 109 (in part) (not Bebb) (1896).

SALIX NIGRA, Havard, *Proc. U. S. Nat. Mus.* viii. 502 (1885). — Sargent, *Silva N. Am.* ix. 103 (in part); *Man.* 168 (in part). — Mackensen, *Trees and Shrubs of San Antonio and Vicinity*, 14, t. 3.

SALIX LONGIPES, *forma* VENULOSA (*forma monstrosa*), Bebb, *Garden and Forest*, viii. 363 (1895).

Leaves involute in the bud, lanceolate, often slightly falcate, acuminate and long-pointed at the apex, gradually narrowed and cuneate at the base, finely glandular-serrate; when they unfold pubescent on the midribs above and sparingly villose below and on the margins, and at maturity glabrous, light green on the upper surface, paler on the lower surface, from 1 to 1.2 decimetres long, and from 1.2 to 1.5 centimetres wide; petioles slender, pubescent early in the season, becoming glabrous, from 8 to 10 millimetres in length. Flowers in slender densely villose aments, terminal on leafy pubescent branchlets, their scales ovate, usually acuminate, thickly coated with long shining matted white hairs more abundant on the inner surface; staminate aments from 6 to 7 centimetres long, their scales broader than those of the pistillate aments; stamens four or five, the filaments covered with long white hairs; pistillate aments from 2 to 7 centimetres long, the flowers on slender glabrous pedicels 2 millimetres in length, ovate, gradually narrowed to the apex, crowned with a nearly sessile two-lobed stigma. Fruit ovate, conical, pale brown, about 5 millimetres in length.

A tree, from 18 to 22 metres high, with a trunk often from 1 to 1.5 metres in diameter, covered with thick pale yellow-brown deeply furrowed rough bark, the surface sometimes separating into long plate-like scales, large erect and spreading branches forming an open irregular head, and slender branchlets light green and slightly pubescent when they first appear, becoming light orange or yellow-brown and lustrous. Flowers in March. Fruit ripens in April and May.

River banks and the moist borders of ponds. Texas: banks of Red River near Denison, Grayson County, *T. V. Munson*, April 12, 1910; Pottsville, Hamilton County, *T. V. Munson*, April 11, 1910; San Antonio, Bixar County, *C. S. Sargent*, March 25, 1881, March 25, 1885, March 29, 1913, *B. F. Bush*, March 22, 1902 (No. 1162); Sutherland Springs, Wilson County, *C. S. Sargent*, March 30, 1913; Kerrville, Kerr County, *A. A. Heller*, April, 1894, *C. S. Sargent*, March 31, 1913; El Paso, El Paso County, *M. E. Jones*, April 24, 1894. New Mexico: Terra Blanca, Sierra County, *Ida N. Beals*, 1904. Colorado: Colorado Springs, El Paso County, *C. S. Sargent*, March 30, 1894 (winter branchlets). Utah: Salt Lake City, Salt Lake County, *M. E. Jones*, May 12, 1880. Arizona: Fort Huachuca, Santa Cruz County, *T. E. Wilcox*, 1894; near Tucson, Santa Cruz County, *C. S. Sargent*, February 27 and March 22, 1894, *J. W. Toumey*,

March 23 and April 15, 1894; Sabina Cañon, Santa Catalina Mountains, Santa Cruz County, *J. W. Toumey*, October 7, 1894. California: Fort Yuma, San Diego County, *C. S. Sargent*, October 1, 1880. Mexico: Nuevo Leon, near Saltillo, *E. Palmer*, April, 1898; Monterey, *C. S. Sargent*, March 19, 1900.

There is certainly no good morphological character by which this tree can be distinguished from *Salix nigra* Marshall. The scales of the aments are usually acute, or even acuminate at the apex of the inflorescence, while at the base they are often rounded as in *Salix nigra*. In *Salix nigra*, however, acute scales sometimes occur at the apex of the inflorescence, showing that little reliance can be placed on the shape of the scales, which are rather more densely covered with hairs than those of some forms of *Salix nigra*. The hairs at the base of the filaments of *Salix Wrightii* are longer and more numerous than those of *Salix nigra*. The real difference, however, between the two trees is in the color of the young branches, and in the color and character of the bark of old trees. These are so distinct that it seems desirable to consider this yellow-twigged Willow a species rather than a variety of *Salix nigra*. The two grow together on the Red River north of Denison, Texas, and often in northern Texas, but from the San Antonio region westward to California *Salix Wrightii* appears to replace entirely the dark-twigged dark-barked *Salix nigra*.

The short pistillate ament of the specimen collected by Charles Wright in New Mexico (No. 1877, in Herb. Gray) on which Andersson founded the species is perhaps abnormal, although shorter pistillate aments sometimes occur on other specimens from New Mexico and Arizona than are usually found on the Texas tree.[1]

[1] NOTES ON SALIX.

One of the forms of *Salix nigra* which is common in southern Arkansas and Louisiana may be distinguished as —

Var. ALTISSIMA, *n. var.*

Leaves lanceolate, acuminate and long-pointed at the apex, gradually or abruptly narrowed and cuneate at the base, slightly falcate, finely serrate, slightly villose above when they unfold, and at maturity glabrous with the exception of the hairs on the under surface of the midribs, from 8 to 11 centimetres long and from 2 to 2.2 centimetres wide; petioles slender, hoary-tomentose, from 7 to 8 millimetres in length; aments hoary-tomentose, from 6 to 7.5 centimetres long, their scales rounded or toward the apex of the ament acute or acuminate, thickly coated with hoary tomentum. Flowers and fruit as in the species.

A tree, sometimes 40 metres high, with a trunk from 1 to 1.5 metres in diameter, covered with rough deeply furrowed reddish brown bark, and slender tomentose branchlets, becoming reddish brown and glabrous by the end of their first season. Flowers early in April. Fruit ripens in May.

Arkansas: Fulton, Hempstead County, *B. F. Bush*, May 20, 1909 (No. 5654), October 4, 1909 (No. 5929), *J. H. Kellogg*, June 20, 1910. Louisiana: Shreveport, Cado Parish, *R. S. Cocks*, April, 1910 (No. 115), Clear Lake, Richland Parish, March 30, 1910 (No. 107), between Rayville and Lucknow, Richland Parish, May 30, 1910 (No. 113); Carenco, La Fayette Parish, *C. S. Sargent*, April 1, 1885; banks of Red River at Alexandria, Rapids Parish, *R. S. Cocks* and *C. S. Sargent*, April 4, 1913; Lake Charles, Calcasieu Parish, *C. S. Sargent*, April 3, 1913; Bayou Sara, West Feliciana Parish, *R. S. Cocks*, March 29 and April 28, 1910 (No. 111), Laurel Hill, West Feliciana Parish, March 30, 1910, swamps, Harvey's Canal, New Orleans, Orleans Parish, April 10, 1910.

The young branches of the typical *Salix nigra* are glabrous or nearly glabrous, but individual plants occur both north and south with tomentose branchlets, and such tomentum cannot be depended on even as a varietal character. The bracts of the aments of the variety are more generally pointed at the apex and more tomentose than those of the typical plant, but these also are characters which cannot be relied upon. The habit of the trees of the variety, the great size and height which individuals attain under favorable conditions, and the fact that they flower from two to three weeks later than the typical trees, make it desirable to distinguish it as a variety. No other American Willow, and perhaps no Willow in any part of the world, grows to the height of this tree on the rich bottom-lands of the Red River in Arkansas, or forms a straight trunk free of branches for a distance of from fifty or sixty feet from the ground. At Lake Charles, Louisiana, the typical *Salix nigra* and this variety grow together, and on April 3, 1913, the variety was just beginning to flower, many of the staminate aments at the ends of the branches being not more than a third grown, while the staminate aments of the typical glabrous trees had entirely disappeared and their fruit was nearly fully grown.

It is possible that it was this variety which was described by Andersson as *S. marginata* (*Svensk. Vetensk. Akad. Handl.* ser. 4, vi. 21 [*Monographia Salicum*] [1867]) based on a specimen in the herbarium at Vienna collected by Drummond at New Orleans which I have not seen. Andersson describes the capsules as "conicis-obtusis, basi sericeo-pubescentibus, ceterum glabris," but I can find no Louisiana specimens with capsules at all inclined to be obtusish or with any pubescence at their base. The specimen collected by Drummond at New Orleans in 1832 (No. 303) and preserved in the Gray Herbarium appears to be intermediate between the species and the variety, as the branchlets are only slightly pubescent and the scales of the aments are less tomentose than those of the variety.

SALIX OCCIDENTALIS, Bosc.

Salix occidentalis of Cuba must be added to the silva of the United States, as it occurs in Dade County in the extreme southern part of Florida.

Little River, *C. S. Sargent*, February 22, 1911; Miami River, April 18, 1886; Paradise Key in the Everglades, *E. A. Bessey*,

May, 1908 ("a tree up to 8 or even 10 metres high, reaching a diameter of from 1.2 to 1.5 decimetres; common on the edge of hammock"). The synonymy of this species is, —

SALIX OCCIDENTALIS, Bosc ex Koch, *Salix europæa Comment*, 16 (1828). — Andersson, *Svensk. Vetensk. Akad. Handl.* ser. 4, vi. 23, t. 2, f. 16 (*Monographia Salicum*); De Candolle, *Prodr.* xvi. pt. ii. 202 (1868).

Salix Humboldtiana, Grisebach, *Fl. Brit. W. Ind.* 113 (not Willdenow) (1864); *Cat. Pl. Cuba*, 41.

Salix Bonplandiana, Sauvalle, *Fl. Cuba*, 134 (not Humboldt, Bonpland and Kunth) (1873). C. S. S.

EXPLANATION OF THE PLATE.

PLATE CLXXXIV. SALIX WRIGHTII.

1. A flowering branch of the staminate tree.
2. A staminate flower with its scale, enlarged.
3. A scale from the base of the ament, enlarged.
4. A scale from the apex of the ament, enlarged.
5. A flowering branch of the pistillate tree, natural size.
6. A pistillate flower with its scale, enlarged.
7. A fruiting branch, natural size.
8. A fruit, enlarged.
9. A branch with leaves, natural size.
10. A winter branchlet.

C. E. Faxon del.

SALIX WRIGHTII, Anderss.

QUERCUS STELLATA, VAR. MARGARETTA, SARG.

QUERCUS STELLATA, var. MARGARETTA, Sargent, *n. var.*

QUERCUS MINOR, Sargent, *Silva N. Am.* viii. 37 (in part), t. 369, f. 1, 2, 4 (1895).

QUERCUS MARGARETTA, Ashe, Small, *Fl. Southeastern U. S.* 355 (1903). — Britton & Shafer, *N. Am. Trees*, 340, f. 299.

From *Quercus stellata* this variety chiefly differs in the rounded or pointed lobes of the leaves and in the often less numerous clusters of stellate hairs on the upper surface of the leaves, which sometimes become glabrous or nearly glabrous above late in the season, and on the lower surface are nearly glabrous, more or less densely pubescent, or often covered with long pale spreading hairs in stellate clusters. Bark, winter-buds, flowers and fruit as in the species.

A tree, sometimes from 10 to 15 metres high, with a trunk 2 metres in diameter, and stout spreading branches forming a rather open round-topped head; or sometimes shrubby.

Virginia: banks of the Appomattox River, near Petersburg, Dinwiddie County, *A. Rehder*, August 22, 1908 (leaves densely stellate-pubescent above, an intermediate form). North Carolina: Moon County, *W. W. Ashe*, October, 1895, May, 1896 (No. 255). Georgia: Somerville, near Augusta, Richmond County, *A. Cuthbert*, September 15, 1902, September 15, 1903, *C. S. Sargent*, March 30, 1908, *T. G. Harbison*, November 7, 1911; Climax, Decatur County, *T. G. Harbison* (with mostly acute lobes of the leaves, "in sandy upland woods with *Q. brevifolia*"). Florida: pine woods, Aspalaga County, *A. H. Curtiss* (No. 2589), near Eustis, Lake County, *G. V. Nash*, August, 1894 (No. 1576), September 4, 1895 (No. 2569, an intermediate form). Alabama: Moon's Valley, *C. Mohr*, November 24, 1894; Girard, Russell County, *T. G. Harbison*, April 26, 1912; Selma, Dallas County, *T. G. Harbison*, September 14 and October 24, 1911, April 10 and May 10, 1912 ("common on sandy barrens east of Selma," the leaves densely pubescent below). Mississippi: Ocean Springs, Jackson County, *Josephine Skehan*, November, 1894; Meridian, Laudersdale County, *T. G. Harbison*, April 19, 1912 ("sand hills"). Arkansas: Arkansas Post, Arkansas County, *John H. Kellogg*, September 27, 1909.[1] Texas: streets of Austin, Travis County, *G. W. Letterman*, 1881; limestone hills, near Austin, *C. S. Sargent*, September 27, 1894 (leaves densely pubescent below, stellate-pubescent above).[2]

Quercus stellata is best distinguished by the square or emarginate lobes of the leaves and by the numerous stellate clusters of hairs which are found on their upper surface. On many forms of the variety *Margaretta* the lobes are rounded or pointed at the apex, but often some of the lobes of such leaves are square at the apex, showing a close connection between the species and the variety. On some individuals with leaves with pointed lobes the clusters of hairs are abundant and persistent, on others they are much less abundant, and are sometimes persistent during the season and sometimes entirely disappear before autumn, so that satisfactory characters cannot be found either in the shape of the leaves or in their pubescence by which this form can be specifically distinguished. The pubescence on the lower surface of the leaves varies equally in the species and in the variety, and the fruit of the variety is both sessile and pedunculate, and varies in size and shape as it does in the species.[3]

C. S. S.

[1] This is an unusual form (see f. 3, t. clxxxv.) with narrow leaves three-lobed at the apex, the base entire, undulate or furnished with one or with two pairs of small acute or rounded lobes. This is possibly a hybrid; but the parentage is not obvious, and this extreme form passes with intermediate forms into *Quercus stellata* and the variety *Margaretta* growing in the same region.

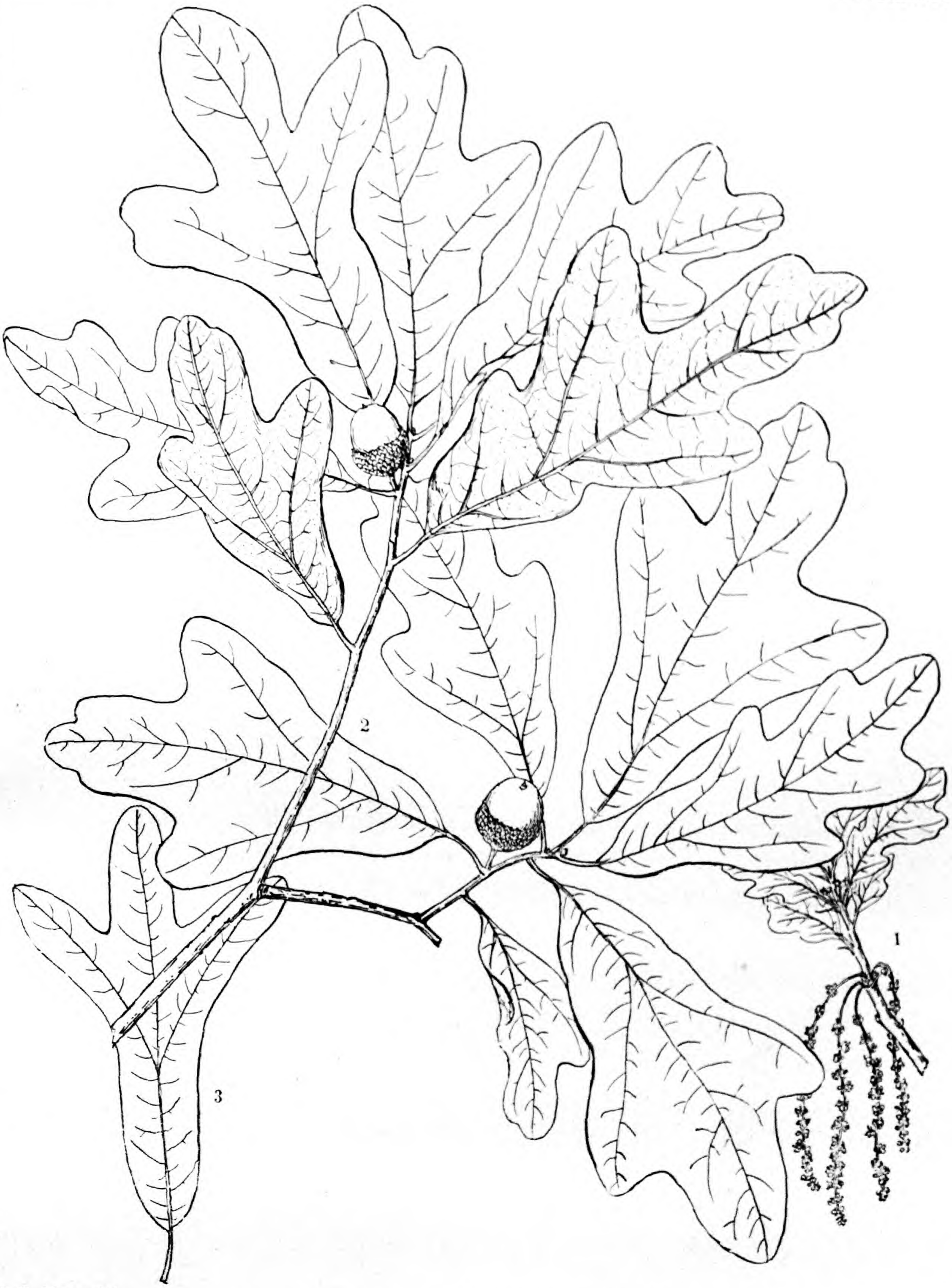
[2] All the specimens here enumerated are preserved in the herbarium of the Arnold Arboretum.

[3] Mr. Faxon's drawing reproduced here is made from specimens from the fine grove of these trees on the grounds of the Hotel Bonair at Somerville, near Augusta, Georgia, which the author of *Quercus Margaretta* has pronounced to be typical of his species.

EXPLANATION OF THE PLATE.

PLATE CLXXXV. QUERCUS STELLATA, var. MARGARETTA.

1. A flowering branch, natural size.
2. A fruiting branch, natural size.
3. A leaf of a tree at Arkansas Post, Arkansas.



C. E. Faxon del.

QUERCUS STELLATA var. MARGARETTA, Sarg.

QUERCUS UTAHENSIS, RYDB.

QUERCUS UTAHENSIS, Rydberg, *Bull. N. Y. Bot. Gard.* ii. 202, t. 25, f. 2 (1901); *Fl. Colorado*, 98. — Britton & Shafer, *North Am. Trees*, 339, f. 297. — Nelson, Coulter, *Man. Rocky Mt. Bot.* ed. 2, 141.

QUERCUS GAMBELII, Liebmann, *Oversigt Dansk. Vidensk. Selsk. Forhandl.* 1854, 169 (not Nuttall). — Sargent, *Silva N. Am.* viii. 33 (in part).

QUERCUS STELLATA, var. δ UTAHENSIS, A. De Candolle, *Prodr.* xvi. pt. ii. 22 (1864).

QUERCUS DOUGLASII, β GAMBELII, A. De Candolle, *Prodr.* xvi. pt. ii. 23 (in part) (1864).

QUERCUS ALBA, var. GUNNISONII, Watson, King's *Rep.* v. 321 (in part) (1871).

QUERCUS GUNNISONII UTAHENSIS (Rydberg), Garrett, *Spring Fl. Wasatch Reg.* 13 (1911).

QUERCUS GAMBELII UTAHENSIS (Rydberg), Garrett, *Spring Fl. Wasatch Reg.* ed. 2, 20 (1912).

Leaves oblong-obovate, gradually narrowed and cuneate or rounded at the base, deeply divided often nearly to the midrib by broad or narrow sinuses into three or four pairs of lateral lobes rounded or acute at the apex, the upper lobes usually again lobed or undulate, the terminal lobe rounded at the apex and entire or three-lobed; about one-third grown when the flowers open and then light green and covered above by small stellate clusters of hairs and pale and soft-pubescent below, with stellate hairs on the midribs and veins, and at maturity thick, dark green, lustrous and glabrous or nearly glabrous on the upper surface, pale and densely soft-pubescent on the lower surface, from 6 to 16 centimetres long and from 4 to 9 centimetres wide, with prominent midribs and primary veins, and conspicuous reticulate veinlets; petioles stout, hoary-tomentose early in the season, pubescent or glabrous before autumn, from 1 to 2.5 centimetres in length; stipules linear-obovate to spathulate, villose, 5 millimetres long, caducous. Staminate flowers in stellate-pubescent aments from 5 to 6 centimetres long; calyx scarious, villose, divided to the middle by wide sinuses into slender acuminate lobes; anthers yellow. Pistillate flowers usually solitary or in pairs, their involucral scales thickly coated with hoary tomentum. Fruit usually solitary, sessile or raised on a stout pubescent peduncle from 6 to 12 millimetres long; cup hemispherical, usually from 2 to 2.5 centimetres wide, pale pubescent on the inner surface, the scales broadly ovate, covered with pale pubescence, much thickened on the back and closely appressed below the middle of the cup, gradually reduced in size upwards, thin and less closely appressed toward its rim bordered by the small free projecting tips of the upper row of scales; acorn ovoid to ovate, broad and rounded at the ends, enclosed for about one-half its length, from 1.5 to 1.8 centimetres long.

A tree, occasionally 10 metres high, with a trunk from 1.5 to 2 decimetres in diameter, covered with dark rough scaly bark, stout erect branches forming a narrow open head, and stout branchlets red-brown and stellate-pubescent when they first appear, becoming light orange-brown and puberulous during their first season. Flowers the end of May or early in June. Fruit ripens in September or October.

Dry slopes of the foothills of the southern Rocky Mountains from southwestern Wyoming[1] to

[1] "*Quercus utahensis* scarcely reaches Wyoming, but it is rather abundant just on the line between northwestern Colorado and southern Wyoming. One of the points at which it has been secured several times is at Baggs, a post office in Wyoming, but very close to the Colorado line." Aven Nelson *in litt.*

Utah, New Mexico and Arizona. Colorado: Boulder, Boulder County, *G. W. Letterman*, August 1, 1854; Manitou, El Paso County, *C. S. Sargent*, August 29 and 30, and September 29, 1894; Palmer Lake, El Paso County, *J. G. Jack*, October 20, 1898, *D. M. Andrews*, October 3, 1911; Stratton Park, Colorado Springs, El Paso County, *E. Bethel* and *C. S. Sargent*, August 14, 1911, *D. M. Andrews*, October 4, 1911; near Cañon City, Frémont County, *C. S. Sargent*, June 24, 1880, August 30, 1894; Durango, La Plata County, *C. S. Sargent*, September 2, 1894, *D. M. Andrews*, October 7, 1911. New Mexico: cañon of the Santa Fé Creek, Santa Fé, Santa Fé County, *C. S. Sargent*, September 4, 1894. Arizona: Flagstaff, Coconino County, common, *C. S. Sargent*, September 8, 1894.[1]

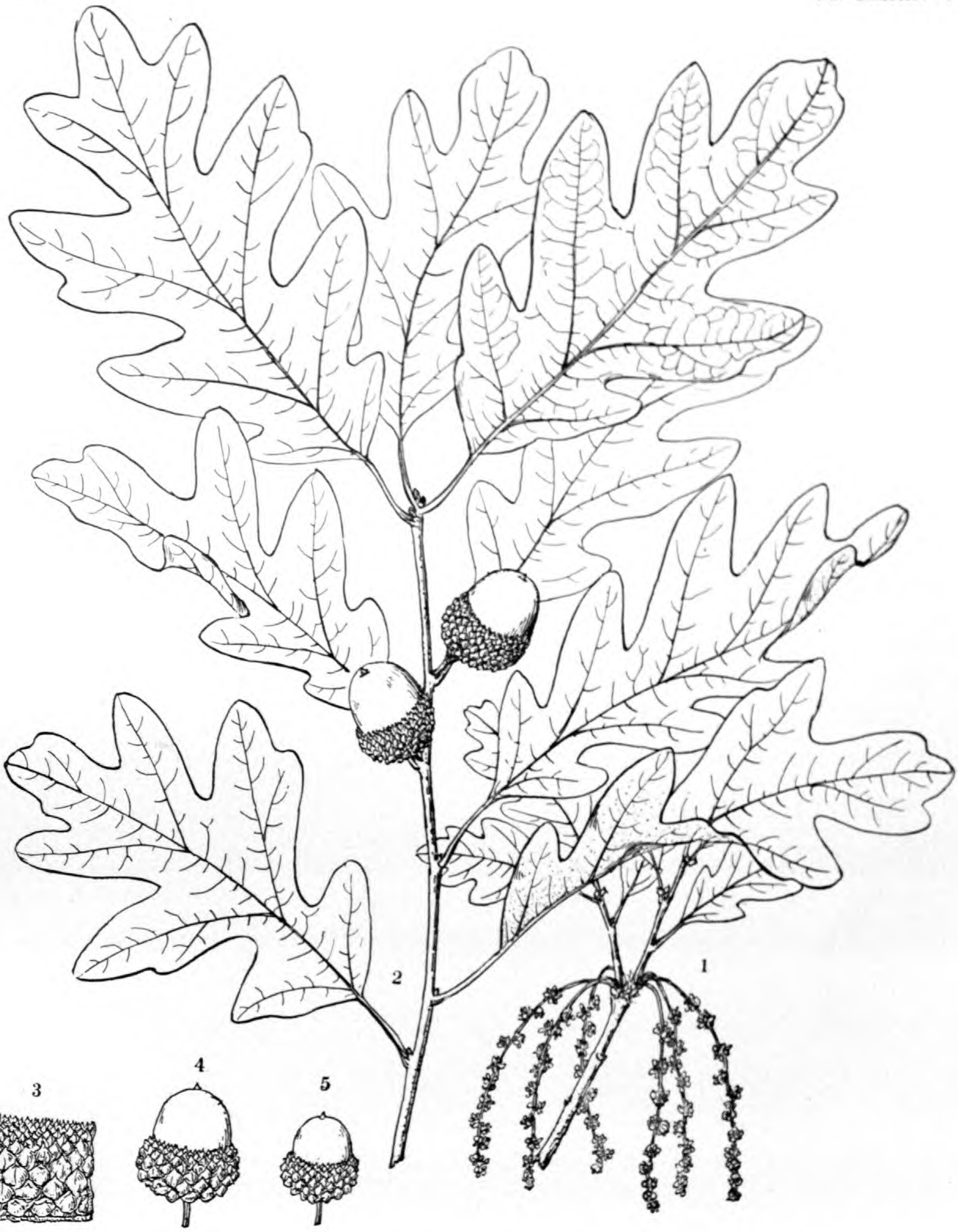
C. S. S.

[1] All these specimens are preserved in the herbarium of the Arnold Arboretum. The flowering specimen drawn by Mr. Faxon and reproduced in the plate of this species was collected by Andrews in Stratton Park, Colorado Springs. The fruiting specimen used by Mr. Faxon is from Manitou.

EXPLANATION OF THE PLATE.

PLATE CLXXXVI. QUERCUS UTAHENSIS.

1. A flowering branch of a tree at Colorado Springs, natural size.
2. A fruiting branch of a tree at Manitou, natural size.
3. A portion of a cup from the same tree, enlarged.
4. A fruit of a tree at Manitou, natural size.
5. A fruit of a tree at Colorado Springs, natural size.



C. E. Faxon del.

QUERCUS UTAHENSIS, Rydb.

QUERCUS LEPTOPHYLLA, RYDB.

QUERCUS LEPTOPHYLLA, Rydberg, *Bull. N. Y. Bot. Gard.* ii. 205, t. 26, f. 1–2 (1901); *Fl. Colorado*, 98. — Britton & Shafer, *N. Am. Trees*, 340, f. 298. — Nelson, Coulter, *Man. Rocky Mt. Bot.* ed. 2, 142.

QUERCUS GAMBELII, Sargent, *Silva N. Am.* viii. 33 (in part) (not Nuttall) (1895).

Leaves oblong to oblong-obovate, cuneate or rarely rounded at the base, divided about half-way to the midribs into from two to four pairs of acute or rounded lateral lobes entire or occasionally furnished on the lower side with a small nearly triangular lobe, the terminal lobe short, entire, or three-lobed; when they unfold thickly coated with hoary tomentum; about one-third grown when the flowers open and then covered above with clusters of stellate hairs and tomentose below, and at maturity thin, dark green, lustrous, and glabrous or nearly glabrous on the upper surface, yellow-green and covered below by short white hairs most abundant on the midribs and veins, from 6 to 15 centimetres long and from 4 to 10 centimetres wide; petioles slender, pubescent, from 1 to 3 centimetres in length; stipules spathulate, acute, gradually narrowed into a stipe-like base, scarious, from 5 to 6 millimetres long, caducous; staminate flowers in slender villose aments; calyx scarious, divided to the base into five or six narrow acute lobes; anthers as the flowers open dark red-brown; pistillate flowers not seen. Fruit solitary or racemose, sessile or on stout tomentose peduncles from 1 to 1.5 centimetres long; cup thin, hemispherical, from 1 to 1.3 centimetres in diameter, covered with acuminate only slightly thickened appressed scales densely covered except at the base with hoary tomentum, enclosing for one-half or two-thirds of its length the oblong ovate acorn abruptly narrowed and rounded at the base, gradually narrowed at the rounded apex, usually from 1.4 to 1.6 centimetres in length.

A tree, from 10 to 15 metres high, with a trunk from 4 to 6 decimetres in diameter, covered with thick furrowed bark, broken on the surface into small appressed pale gray scales, heavy spreading ashy-gray branches forming a round-topped head, and stout branchlets light red-brown or purple and covered with stellate clusters of long hairs when they first appear, becoming light brown and glabrous during their first season.

Colorado: rich bottom-lands on the Cucharas River above La Veta, Huerfano County, common, *E. Bethel* and *C. S. Sargent*, August 15, 1911, *D. M. Andrews*, October 5, 1911, June, 1912.

This species is the largest of all the Oaks of the Rocky Mountains of Colorado and the only species which grows on bottom-lands, the others inhabiting dry hillsides. It is best distinguished from the other species of the region by the thin scales of the cup which do not become thick and corky as in other species from the interior of the continent, with the exception of *Quercus submollis* Rydberg, from Arizona, a species which, except in the thin scales of the cup, resembles *Quercus utahensis* Rydberg.[1]

[1] A note on an interesting hybrid Oak may be added here.

QUERCUS LUDOVICIANA, *n. hyb.* (*Quercus pagodæfolia* × *Phellos*).

Leaves early in the season dark green, lustrous and sparingly stellate-pubescent above, and paler and thickly covered below with small clusters of stellate hairs and densely villose on the midribs, at the base of the branch of the year from 1.6 to 2 decimetres long and from 8 to 10 centimetres wide, oblong to oblong-obovate, cuneate at the base, usually five-lobed, the lateral lobes acuminate, pointing forward, entire, separated by broad shallow sinuses, the upper lobes usually larger than those of the lower pair, the terminal lobe long-acuminate, entire or more or less undulate on the margins; the upper leaves gradually growing narrower and less deeply lobed, and at the apex of the branch lanceolate, occasionally falcate, undulate or entire, long-acuminate, cuneate or rounded and often unsymmetrical at the base, from 1.4 to 1.7 decimetres long and from 2 to 3 centimetres wide; petioles

slender, densely stellate-pubescent, from 2.5 to 3 centimetres in length. Pistillate flowers on stellate-pubescent peduncles about 5 millimetres in length, their involucral scales coated with pale hairs; stigmas red. Staminate flowers and fruit unknown.

A single tree, about 18 metres high, with a trunk six decimetres in diameter, covered with close pale bark, large spreading branches forming a narrow round-topped head, and slender branchlets thickly coated early in the season with clusters of stellate hairs.

Low, rich, often inundated woods, growing with *Quercus pagodæfolia* and *Quercus Phellos* in Peteville, fifteen miles west of Opelousas, Saint Landry Parish, Louisiana, *R. S. Cocks* and *C. S. Sargent*, April 4, 1913.

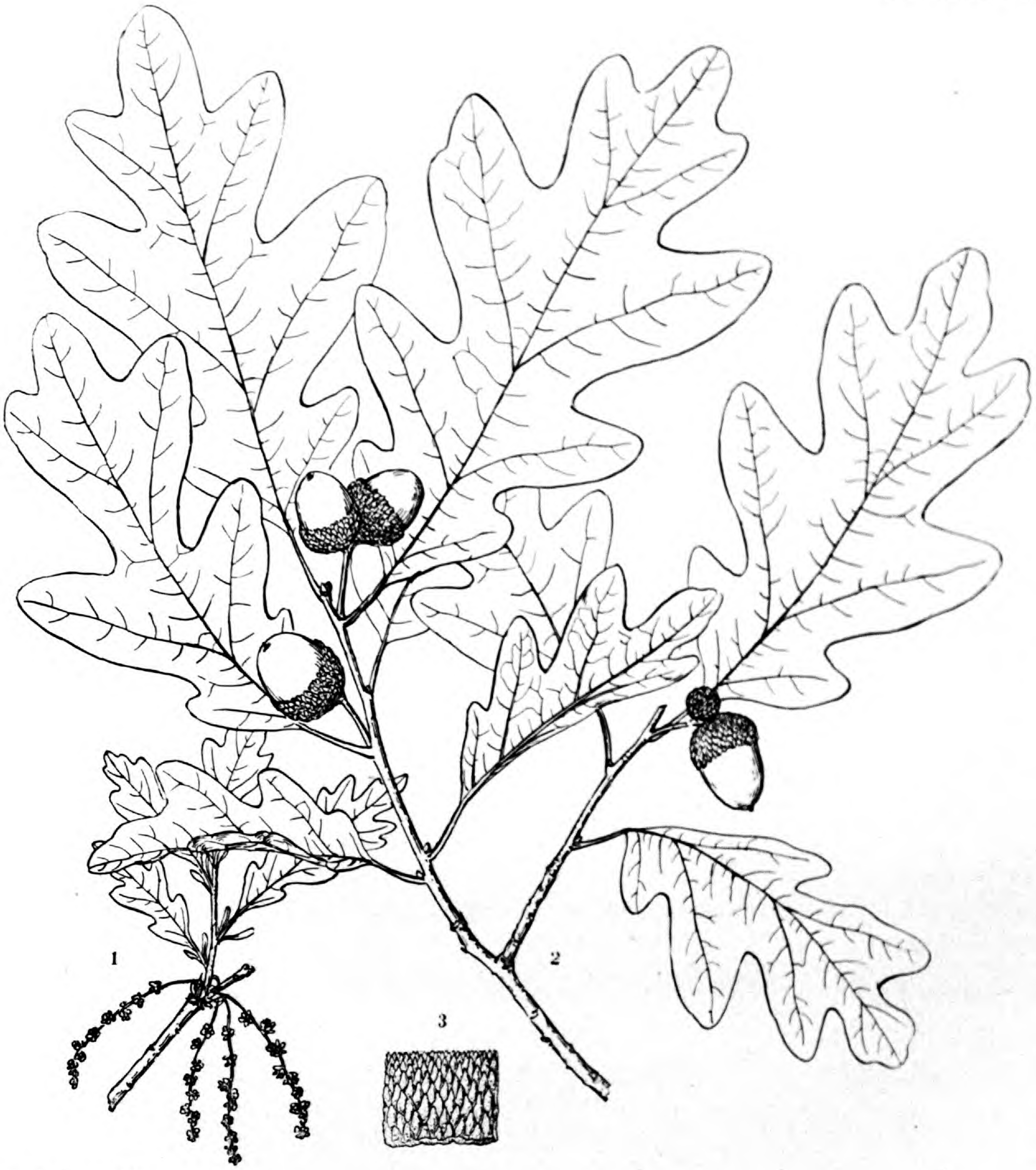
The shape of the leaves of this tree shows the influence of its supposed parents. The leaves at the base of the branch generally resemble those of *Quercus pagodæfolia;* they are, however, less deeply divided and only five-lobed, not from five- to eleven-lobed; the lateral lobes are not spreading, and the lanceolate terminal lobe is much longer than the terminal lobe of *Quercus pagodæfolia.* The terminal leaves generally resemble those of *Quercus Phellos,* but they are longer and broader and are often undulate, and are rounded or abruptly cuneate, not acuminate, at the base. The pubescence, although less dense, is that of *Quercus pagodæfolia,* which has been the more potent factor in the production of this hybrid.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CLXXXVII. Quercus leptophylla.

1. A flowering branch, natural size.
2. A fruiting branch, natural size.
3. Portion of a cup, enlarged.



C. E. Faxon del.

QUERCUS LEPTOPHYLLA, Rydb.

MALUS GLABRATA, REHD.

MALUS GLABRATA, *n. sp.*

MALUS GLAUCESCENS, Rehder, Sargent, *Trees and Shrubs*, ii. 139 (in part) (1911).

Leaves triangular-ovate or ovate, acute or acuminate at the apex, cordate or rarely truncate at the base, with two or three pairs of short-acute or short-acuminate irregularly and coarsely serrate lobes passing toward the apex into unequal teeth, the lowest pair of lobes from 1 to 2 centimetres long; the leaves of the flowering branchlets smaller than those of the vigorous shoots, distinctly lobed; when they unfold bronze color and sparingly covered with caducous loose hairs, quite glabrous when fully expanded, and at maturity dark yellow-green and lustrous on the upper surface, light or pale green but not glaucescent on the lower surface, from 5 to 9 centimetres long and from 4 to 8 centimetres broad, with from five to seven pairs of veins slightly impressed above and prominent below, the lowest pair springing from the base of the leaf; petioles slender, glabrous, from 2 to 3 centimetres in length. Flowers about 3 centimetres in diameter, on slender glabrous purple pedicels from 1.5 to 3 centimetres long, in from four- to seven-flowered umbel-like racemes; calyx-tube obovoid, glabrous and purple, the lobes lanceolate-oblong, glabrous on the outside, tomentose on the inside, slightly longer than the tube; petals suborbicular or broadly ovate, rarely oval, rounded at the apex and abruptly contracted into a short claw, often erose-denticulate, from 1.2 to 1.4 centimetres long and from 1.1 to 1.3 centimetres broad; stamens about one-third shorter than the petals, with dark anthers; styles five, slightly longer than the stamens, villose below the middle and connate for about one-fourth their length at their base. Fruit depressed-globose, slightly angled and distinctly ribbed at the deeply impressed apex, with a deep cavity at the base, about 3 centimetres high and 4 centimetres in diameter, the pedicels slender, about 2 centimetres long; seed obovoid-oblong, chestnut brown, about 8 millimetres in length.

A tree, from 6 to 8 metres high, with spreading branches, often armed with stout straight spines from 1.5 to 4 centimetres long; branchlets glabrous, purple, becoming purple-brown and slightly lustrous at the end of the first season, dull red-brown the second year and later dark grayish brown. Winter-buds ovoid or oblong-ovoid, acutish, dark purple-brown, glabrous. Flowers at the end of April or early in May. Fruit ripens the beginning of October.

North Carolina: near Biltmore, Buncombe County, *T. G. Harbison*, April 29, 1911 (No. 522, type), October 5, 1910 (No. 192, fruit); May 3, 1897 (Biltmore Herbarium, No. 1297 b, in part). Alabama: Valleyhead, De Kalb County, *T. G. Harbison*, October 7, 1910 (Nos. 196 & 696), October 11, 1911 (No. 696).

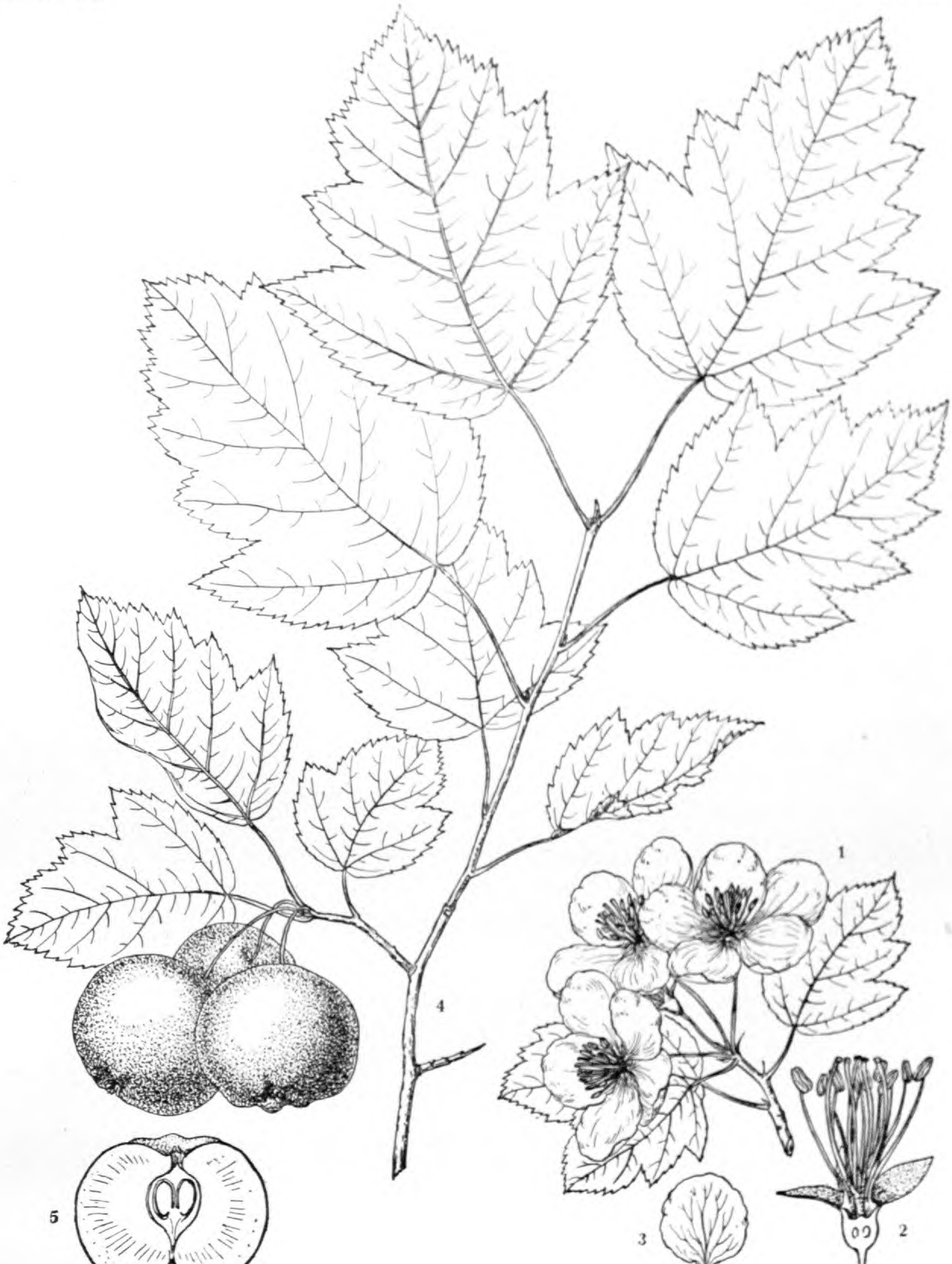
From the allied species *Malus glabrata* is easily distinguished by the glabrous deeply lobed leaves distinctly cordate at the base and by the lowest pair of lateral veins springing from the very base of the leaf. Its closest relationship seems to be with *M. glaucescens* Rehder, which differs chiefly in the following characters: the leaves, with the lowest pair of the veins inserted some distance above the usually truncate base, are covered when unfolding with a villose tomentum which is dense on the lower surface and which gradually disappears; they are usually dull and pale green while young, those of the flowering branchlets being divided into shorter and more obtuse lobes, or sometimes they are very slightly or not at all lobed, and at maturity are distinctly glaucous on their under surface; the petioles and branchlets are thinly villose while young. The calyx-tube is thinly villose outside; the petals are oval, usually more or less gradually narrowed into the claw; and the styles are slightly shorter than the stamens. The fruit is depressed-globose, not angled, and not or scarcely ribbed at the less deeply impressed apex.

ALFRED REHDER.

EXPLANATION OF THE PLATE.

PLATE CLXXXVIII. MALUS GLABRATA.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A petal, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, natural size.



C. E. Faxon del.

MALUS GLABRATA, Rehd.

MALUS PLATYCARPA, REHD.

MALUS PLATYCARPA, Rehder, *n. sp.*

Leaves ovate to elliptic, rounded at the base, abruptly contracted at the rounded apex into a very short point, sharply and usually doubly serrate, the smaller leaves on the flowering branches sometimes nearly crenately serrate, those on very vigorous shoots broadly ovate and usually with several pairs of very broad triangular lobes, the lowest not exceeding 1 centimetre in length, and toward the apex passing into large teeth; when they unfold covered with long white hairs caducous except on the midrib, and at maturity glabrous, dark yellow-green, lustrous and slightly rugulose on the upper surface, light green on the lower surface, from 6 to 8 centimetres long and from 4 to 5.5 centimetres broad, those of vigorous shoots covered on the midrib and the primary veins with a slight villose tomentum and sometimes 1 decimetre long and 9 centimetres broad, with from five to seven pairs of lateral veins slightly impressed above and elevated below. Flowers about 4 centimetres in diameter, on glabrous pedicels from 2 to 4 centimetres in length in from three- to six-flowered raceme-like umbels; calyx-tube obconic, glabrous, the lobes lanceolate, acuminate, longer than the tube, glabrous on the outer surface, densely tomentose on the inner surface; petals orbicular-obovate, usually irregularly incisely dentate and abruptly contracted at the base into a short claw, rounded at the apex, from 1.8 to 2 centimetres long and from 1.2 to 1.8 centimetres broad, slightly villose on the inside near the base; stamens slightly shorter than the petals, with dark anthers; styles five, somewhat shorter than the stamens, villose below the middle and connate below for one-third of their length. Fruit on slender pedicels from 3 to 3.5 centimetres long, depressed-globose, with deep cavities at the apex and at the base, slightly ribbed at the apex, from 3.5 to 4 centimetres high and from 5 to 5.5 centimetres in diameter; calyx persistent, upright, not exceeding the deep apical cavity; seeds chestnut brown, oblong-obovoid, 9 millimetres in length.

A small tree, about 6 metres tall, with a trunk about 2 decimetres in diameter, with spreading unarmed branches, and branchlets at first clothed with a thin villose tomentum, becoming glabrous, brown or purple-brown and lustrous at the end of the first year, dull brown the second year, and ultimately grayish brown. Winter-buds ovate, acutish, glabrous except at the villose margin of the scales, purplish brown. Flowers appear at the end of April. Fruit ripens in October and November.

North Carolina: near Franklin, Macon County, *T. G. Harbison*, April 22, 1911 (No. 503, type), April 21, 1911 (No. 504), November 3, 1911 (No. 745), December 3, 1911 (No. 757); three miles from Franklin, *T. G. Harbison*, November 2, 1911 (No. 742, fruit). Georgia: Rabun County, *T. G. Harbison*, April 25, 1911 (No. 512).

This species is most closely related to *M. fragrans* Rehder, but is easily distinguished from this and other species by its broad and large leaves which are rounded and abruptly acuminate at the apex and are never lobed, and by its very large fruit. Mr. Harbison informs us that scattered trees of this species are found near Franklin at a distance of from 3 to 15 miles from the locality where he discovered it first. As this tree grows in the fertile soil of bottoms it has been nearly exterminated by the clearing of the valleys. No. 745 has smaller fruit and No. 512 has somewhat smaller flowers with the petals more broadly oval in outline. The fruit is used for preserves.[1]

[1] MALUS PLATYCARPA, var. HOOPESII, *n. comb.*

Malus coronaria var. *Hoopesii*, Rehder, Sargent, *Trees and Shrubs*, ii. 142 (1911).

This variety, which is only known from cultivated plants, shows by the shape of its leaves and by the large fruit a closer relation to this species than to *M. fragrans*.

Though we have received during the last two years much additional material of the group Coronariæ, it is not yet sufficient to arrive at a clear understanding of the numerous forms of this polymorphic group. It may be useful, however, to give here a key to the species as they can be distinguished with our material, and under the several species an enumeration of the specimens in the herbarium of the Arnold Arboretum.

KEY TO THE SPECIES OF THE SUBSECTION CORONARIÆ.

Leaves glabrous at maturity; calyx glabrous or more or less villose in No. 2 and in varieties of No. 4 and 6.
Leaves serrate, acute or acuminate.
Leaves distinctly lobed, at least those of vigorous shoots; those of flowering branchlets usually incisely serrate or lobed.
Leaves of shoots cordate at the base with the lowest pair of veins springing directly from the base, glabrous nearly from the beginning, light green on the lower surface. 1. M. GLABRATA.
Leaves truncate or rounded, the lowest pair of veins some distance from the base, more or less villose when they unfold.
Leaves glaucescent beneath, thickish at maturity; calyx-tube thinly villose. 2. M. GLAUCESCENS.
Leaves light green on the lower surface, rather thin; calyx-tube glabrous. 3. M. FRAGRANS.
Leaves serrate, not lobed, or sometimes slightly lobed at the end of vigorous shoots.
Leaves oval or elliptic, acute; fruit much depressed, up to 5.5 centimetres in diameter. 4. M. PLATYCARPA.
Leaves lanceolate, acuminate, thin; fruit subglobose. 5. M. LANCIFOLIA.
Leaves crenate-serrate, rounded at the apex, usually not or only slightly lobed and cuneate at the base, assuming a brown color in drying; fruit subglobose. 6. M. CORONARIA.
Leaves tomentose or villose at maturity, at least those of vigorous shoots, thickish and strongly veined.
Calyx glabrous outside; pedicels with conspicuous bracts and bractlets; leaves usually only slightly lobed, generally ovate; those of the flowering branchlets glabrous or nearly so. 7. M. BRACTEATA.
Calyx tomentose or pubescent on the outside; pedicels usually without or with inconspicuous bractlets; leaves usually incisely lobed, generally oblong-ovate, all more or less densely pubescent or tomentose beneath, rarely glabrescent. 8. M. IOENSIS.

ENUMERATION OF THE SPECIES.

1. MALUS GLABRATA, Rehder. See p. 225.

2. MALUS GLAUCESCENS, Rehder, Sargent, *Trees and Shrubs*, ii. 139, t. 157 (1911).

This species seems to be confined to northwestern New York and to Ontario. The specimens from North Carolina and Alabama which I had referred in my original description to this species do not belong here. The specimens from North Carolina must be referred to *M. glabrata* Rehder and those from Alabama to *M. fragrans* Rehder. From the description of *M. glaucescens*, therefore, the statements that the leaves are bronze-colored when unfolding and that the calyx-tube is sometimes glabrous on the outside should be omitted.

3. MALUS FRAGRANS, *n. nom.*

Pyrus coronaria, Du Roi, *Harbk. Baumz.* ii. 229 (not Linnæus) (1772). — Marshall, *Arbust. Am.* 118. — Wangenheim, *Beytr. Forstwiss.* 61, t. 21, f. 47. — Aiton, *Hort. Kew.* ii. 176. — Willdenow, *Berl. Baumz.* 265; *Spec.* ii. pt. ii. 1019. — Pursh, *Fl. Am. Sept.* i. 340. — Nuttall, *Gen.* i. 307. — Sims, *Bot. Mag.* xlv. t. 2009. — Elliott, *Sketch*, i. 559. — Ker, *Bot. Reg.* viii. t. 651. — Gray, *Man.* 129. — Sargent, *Silva N. Am.* iv. 71, t. 167.

Malus coronaria, Moench, *Meth.* 682 (not Miller) (1794). — Michaux, *Fl. Bor. Am.* i. 292. — Poiret, *Encycl. Méth.* v. 562. — Michaux f., *Hist. Arb. Am.* iii. 65, t. 10. — Spach, *Hist. Vég.* ii. 136, t. 8. — Britton & Brown, *Ill. Fl.* ii. 235, f. 1979.

Malus microcarpa coronaria, Carrière, *Pommiers Microcarpes*, 133, f. 17 (1883); *Rev. Hort.* 1884, 104, f. 24.

Malus glaucescens, Britton & Brown, *Ill. Fl.* ed. 2, ii. 289, 2323 (in part, not Rehder) (1913).

New York: Canandaigua, Ontario County, *B. H. Slavin*, May 19 and September 2, 1910 (No. 1); South Buffalo, Erie County, *B. H. Slavin*, May 23 and September 22, 1911 (Nos. 5, 12), *John Dunbar*, May 28 and September 17, 1906; Salamanca, Cattaraugus County, *B. H. Slavin*, May 23, September 18, 1911 (Nos. 7, 15); Penn Yan, Yates County, *J. Dunbar*, June 2, 1909, *C. S. Sargent*, and *C. C. Laney*, October 17, 1909; Chapinville, Ontario County, *J. Dunbar*, September 17, 1910 (No. 2); Geneva, Ontario County, *A. Rehder*, August 10, 1899. Pennsylvania: Orbisonia, Huntington County, *C. S. Sargent*, May 27, 1908; Strousburg, Munroe County, *C. S. Sargent*, May 22, 1908; near Rock, Schuylkill County, *C. S. Sargent*, September 18, 1902; Penryn, Lebanon County, *A. A. Heller* and *E. G. Halbach*, May 27, 1893 (No. 875); Bedford Springs, Bedford County, *B. H. Smith*, May 14–15, 1913. Delaware: near Stanton, New Castle County, *W. M. Canby*, May 13, 1897. Alabama: Valleyhead, De Kalb County, *T. G. Harbison*, October 7, 1910 (Nos. 194, 196); October 11, 1911 (No. 696).

This species has been confused by most authors with the *Pyrus coronaria* of Linnæus, which is the *Pyrus angustifolia* of Aiton and later authors. *Malus fragrans* is most nearly related to *M. glaucescens*, but differs in the less deeply lobed more elongated leaves, green, not glaucous below at maturity, in the glabrous calyx-tube, and in the fruit being strongly ribbed at the deeply impressed apex.

The form figured by Wangenheim on tab. 21, fig. 47, and referred by most authors to *M. coronaria* Miller (*M. angustifolia* Michaux) hardly belongs to that species, but is a rather unusual form of *M. fragrans* and agrees fairly well with specimens from South Buffalo and from Salamanca, New York, which I have before me. The New York specimens closely resemble the plant cultivated in Europe as *M. coronaria*.

MALUS FRAGRANS, var. ELONGATA, Rehder, *n. var.*

Leaves generally oblong-ovate, gradually narrowed toward the apex, or narrowly triangular, acuminate, rounded at the base or broadly cuneate, incisely serrate or slightly lobed, from 6 to 8 centimetres long and from 3 to 5 centimetres broad, floccose-tomentose when unfolding, soon becoming glabrous, dark yellow-green above, light yellow-green below, on the flowering branchlets smaller and usually incisely serrate; on the end of very vigorous shoots ovate, lobed and slightly pubescent beneath, particularly on the veins. Outside of calyx and the inflorescence quite glabrous. Fruit depressed-globose, from 2.5 to 3 centimetres in diameter.

A shrub or small tree, sometimes 6 metres tall, of straggling habit; branchlets slightly pubescent while young, becoming dark purplish brown and lustrous toward the end of their first season, older branches dark grayish brown, unarmed or with a few short spines. Winter-buds glabrous or nearly so, dark reddish brown. Flowers appearing after the middle of May.

North Carolina: Highlands, Macon County, *T. G. Harbison*, May 20, 1911 (No. 625, type), October 3–4, 1911 (No. 686); Macon County, September 5 and 6, 1910 (Nos. 128, 134, 135). West Virginia: near Elkins, Randolph County, *A. Rehder*, August 24, 1907. Georgia: Rabun County, *T. G. Harbison*, October 1, 1910 (No. 189). New York: South Buffalo, Erie County, *B. H. Slavin*, May 23 and September 22, 1911 (No. 13); Canandaigua, Ontario County, *B. H. Slavin*, May 19, 1911 (No. 23), May 19 and September 20, 1911 (No. 14); Seneca Junction, Ontario County, *B. H. Slavin*, September 18, 1911 (No. 11); between Salamanca and Olean, Cattaraugus County, *B. H. Slavin*, May 23, 1911 (No. 11); Olean, Cattaraugus County, *B. H. Slavin*, May 23 and September 18, 1911 (No. 10).

This variety is easily distinguished from the type by its narrowly triangular and distinctly incised-serrate or lobed leaves. The leaves on specimens from western New York are usually somewhat broader and less triangular in outline and approach in this respect the type of the species.

4. MALUS PLATYCARPA, Rehder, see p. 227.

5. MALUS LANCIFOLIA, Rehder, Sargent, *Trees and Shrubs*, ii. 141, t. 158 (1911).

This species ranges from northeastern Missouri through Indiana to Pennsylvania and North Carolina.

In the original description of this species no specimen was designated as the type, and the specimens from Scranton, Pennsylvania, being placed first on account of the geographical arrangement of the localities from east to west, might be taken for the intended type, but the drawings and the description were chiefly based on the specimens from Courtney, Missouri, which were the most complete; and these ought to be considered the type of the species. Many of the specimens, including that from Scranton, were fragmentary and may possibly belong to other species or represent variations of *M. lancifolia* approaching other species. The following specimens of the Arnold Arboretum Herbarium can be considered as representing typical *M. lancifolia*:

Missouri: Courtney, Jackson County, *B. F. Bush*, April 29, 1906 (No. 3869, type), May 23, 1894 (No. 283), July 1, 1905 (without No.), July 10, 1911 (No. 6468), August 19, 1911 (No. 6494), May 3, 1911 (No. 6464 A); near Independence, Jackson County, June 10, 1894 (No. 281). Indiana: Delaware County, *C. C. Deam*, August 19, 1911 (No. 9790). Pennsylvania: Allegheny County, *T. C. Porter*, May 10, 1872; near Hartstown, Crawford County, *O. E.* and *Grace K. Jennings*, May 29–31, 1909; Bedford Springs, Bedford County, *B. H. Smith*, May 15, 1913. North Carolina: near Asheville, Buncombe County, *T. G. Harbison*, April 29, 1912 (No. 521); Biltmore, Buncombe County, *T. G. Harbison*, April 29, 1912 (No. 523).

6. MALUS CORONARIA, Miller, *Dict.* ed. 8, No. 2 (1768).

Pyrus coronaria, Linnæus, *Spec.* 480 (1753).

Pyrus angustifolia, Aiton, *Hort. Kew.* ii. 176 (1789). — Lindley, *Bot. Reg.* xiv. t. 1207. — Torrey & Gray, *Fl. N. Am.* i. 471. — Sargent, *Silva N. Am.* iv. 75, t. 169.

Malus angustifolia, Michaux, *Fl. Bor.-Am.* i. 292 (1803).

Malus sempervirens, Desfontaines, *Hist. Arb.* ii. 141 (1809). — *Nouveau Duhamel*, vi. 138, t. 43, f. 1. — Loiseleur, *Herb. Amat.* iii. t. 154.

Pyrus sempervirens, Willdenow, *Enum. Hort. Berol.* Suppl. 35 (1813).

Pyrus coronaria, var. *angustifolia*, Wenzig, *Linnæa*, xxxviii. 41 (1874).

Chloromeles sempervirens, Decaisne, *Fl. des Serres*, xxiii. 156 (1880).

Malus microcarpa sempervirens, Carrière, *Pommiers Microcarpes*, 136, f. 18 (1883).

This species is distributed from the coast region of Virginia to northern Florida and the valley of the Pearl River in Mississippi, and in Louisiana is replaced by the variety *puberula*. It is the *Pyrus coronaria* of Linnæus, but not of later authors. It is hardly possible to know from Linnæus's description, which consists only of the words "foliis serrato-angulosis," which species he had in mind; but Clayton's specimen upon which he based his species is still preserved in the British Museum, and this represents the species later called *Pyrus angustifolia* by Aiton, which, moreover, is the only species growing in the region where Clayton made his collections. It may seem somewhat doubtful whether Miller's *Malus coronaria* is the same species, as he quotes as a synonym *Malus Sylvestris virginiana* from his *Catalogue of Trees, Shrubs, and Plants* published in 1730, but at that time *Pyrus angustifolia* Aiton had not been introduced into England, according to Aiton, who gives 1724 as the date of introduction of his *Pyrus coronaria* and 1750 that of *P. angustifolia*. Miller, however, gives neither in his Catalogue nor in his Dictionary a description of the tree, and as he bases his species on *Pyrus coronaria* of Linnæus we must consider his species the same as that of Linnæus; he speaks, moreover, of his *Malus coronaria* as a plant tender in England, which seems to indicate that he refers to the southern species, which is much more tender than *M. fragrans*.

MALUS CORONARIA, var. PUBERULA, *n. var.*

Leaves oblong to oblong-elliptic, acute at the ends, rarely obtuse at the apex, crenately serrate, from 2.5 to 5 centimetres long and from 1 to 2 centimetres broad, slightly appressed-villose below particularly on the veins while young, usually glabrous at

maturity; those of vigorous shoots elliptic or elliptic-oval to ovate-oblong, broadly cuneate at the base, sometimes nearly rounded at the apex, usually coarsely serrate and sometimes incisely serrate, up to 7 centimetres long and up to 3.5 centimetres broad, thinly pubescent below while young, at maturity nearly glabrous except those at the end of the branches which more or less retain their pubescence; petioles slender, from 1 to 2 centimetres in length, puberulous. Flowers usually from two to four, about 2.5 centimetres in diameter; pedicels slender, slightly villose; calyx-tube glabrous or with a few hairs near the base, rarely villose or tomentose; sepals narrowly triangular-ovate, slightly longer than the tube; petals oval, the blade about 1 centimetre long and 7 millimetres broad, narrowed into a slender claw 3 millimetres in length; stamens about one-third shorter than the petals; styles villose below the middle, connate only at the base.

Louisiana: Winnfield, Winn Parish, *R. S. Cocks* and *C. S. Sargent*, April 6, 1913 (type); Covington, Saint Tammany Parish, *R. S. Cocks*, March 28, and April 27, 1913; Bayou Lacombe, Saint Tammany Parish, *R. S. Cocks*, April, 1908 (No. 1779); West Feliciana Parish, *R. S. Cocks*, April 20, 1913; *R. S. Cocks* and *C. S. Sargent*, April 4, 1913. Mississippi: Washington, five miles east of Natchez, Adams County, *C. S. Sargent*, April 9, 1913.

This variety differs from the type chiefly in its pointed leaves, in the slightly villose pedicels and in the slight pubescence on the under side of the young leaves; it approaches glabrescent forms of *M. ioensis*, var. *Palmeri* Rehder, and perhaps still more *M. ioensis*, var. *Bushii* Rehder. The specimens from Natchez, as well as those from Covington and Bayou Lacombe, have the leaves generally somewhat larger and broader and more frequently obtuse or obtusish at the apex. They form a transition toward typical *M. coronaria*.

7. MALUS BRACTEATA, *n. sp.*

Leaves elliptic-ovate to oblong-ovate, acute or those of the flowering branchlets acutish or obtusish, serrate or incisely serrate, sometimes slightly lobed near the base, from 4 to 8 centimetres long and from 2.5 to 3.5 centimetres broad, those of vigorous shoots usually ovate, with recurved very short lobes on each side, from 8 to 9 centimetres long and from 5.5 to 6 centimetres broad; when they unfold thinly covered below with a floccose tomentum, soon becoming glabrous, and at maturity subchartaceous, bright yellow-green and somewhat lustrous above, light green below, or those at the ends of vigorous branches slightly pubescent below particularly on the veins; petioles from 1.5 to 2.5 centimetres in length, glabrous or on vigorous shoots slightly pubescent, usually reddish like the midribs below. Racemes from three- to five-flowered; pedicels about 2 centimetres long, glabrous or nearly glabrous, with subulate bractlets from 5 to 8 millimetres in length, persisting during anthesis; calyx-tube glabrous; calyx-lobes lanceolate, slightly longer than the tube, villose within, glabrous without; petals oval, from 1 to 1.4 centimetres long, narrowed into a slender claw, deep pink; stamens about one-third shorter than petals; styles slightly shorter than the stamens, villous in their lower third, connate at the base. Fruit depressed-globose, from 2 to 2.3 centimetres high and from 2.5 to 3 centimetres in diameter, with a shallow cavity at the base and a very shallow slightly corrugated cavity at the apex, yellowish green, slightly viscid.

A tree, from 5 to 10 metres tall, with stout crooked branches forming a broad head, a trunk about 2.5 decimetres in diameter covered with dark bark broken into small and thin closely appressed scales, and glabrous branchlets on vigorous shoots pubescent toward the apex, becoming reddish brown and lustrous at the end of the season and later dull reddish brown and armed with a few stout spines or unarmed. Winter-buds red-brown, lustrous, glabrous or slightly pubescent. Flowers at the end of April. Fruit ripens the beginning of October.

Missouri: Campbell, Dunklin County, *B. F. Bush*, April 22, 1912 (No. 6631 A, type), April 19, 1912 (Nos. 6593, 6595), April 20, 1912 (No. 6618), April 22, 1912 (No. 6628), September 6, 1910 (No. 6211), September 13, 1910 (No. 6332), October 6, 1912 (Nos. 6883, 6896), *B. F. Bush* and *C. S. Sargent*, October 3, 1912; Monteer, Shannon County, October 20, 1911, *B. F. Bush*, October 20, 1911 (No. 6518).

This species differs from the following species in its less deeply serrate or lobed leaves, those of the flowering branchlets being usually only slightly serrate, in the usually only slightly pubescent leaves at the end of the vigorous shoots, and in the bracteolate inflorescence. In the partly glabrous or nearly glabrous leaves and in the glabrous calyx it resembles *M. fragrans*, which however, has the mature leaves quite glabrous. It suggests a glabrescent form of *M. ioensis* Britton or a pubescent form of *M. fragrans* Rehder.

8. MALUS IOENSIS, Britton, *Man.* 516 (1901). — Sargent, *Man.* 354, f. 3, 278.
Pyrus coronaria, var. *ioensis*, Wood, *Class Book*, new ed. 333 (1860). — Sargent, *Silva N. Am.* iv. 72, t. 168.
Pyrus ioensis, Bailey, *Am. Gard.* xii. 473, f. 7, 8 (1891). — Bean, *Bot. Mag.* cxxxix. t. 8488.
Malus coronaria, var. *ioensis*, Schneider, *Ill. Handb. Laubholzk.* i. 724, f. 401, q–r² (1906).

The typical form of this species ranges from Minnesota and Wisconsin to Nebraska, Kansas and Missouri and, if the varieties are included, south to Texas. *Malus ioensis* is a very variable species and the most extreme forms look very distinct, but these are so closely connected by intermediate forms that it seems impossible to separate them specifically.

None of the specimens from Missouri seem to represent the typical *M. ioensis*. Specimens from Allenton and from Williamsville, and some of those from Courtney, are transitions to *M. fragrans*, while specimens from Monteer and some of those from Courtney approach *M. ioensis* var. *Palmeri*, and a specimen (No. 6570) collected by Bush at Campbell approaches *M. lancifolia*.

MALUS IOENSIS, var. PALMERI, Rehder, Sargent, *Trees and Shrubs*, ii. 142 (1911).

Missouri: Webb City, Jasper County, *E. J. Palmer*, April 28, 1909 (No. 1795, type), September 22, 1901, August 6, 1909 (No. 2605), April 19, 1911 (Nos. 3347, 3348), September 17, 1911 (No. 3474), April 23, 1911 (No. 3349), July 16, 1911 (No. 3431), October 8, 1911 (No. 3495), April 28, 1912 (Nos. 3599, 3600, 3608, 3616); Prosperity, Jasper County, *E. J. Palmer*, April 21, 1912 (No. 3596); Smithfield, Jasper County, May 5, 1912 (No. 3641); Independence, Jackson County, *B. F. Bush*, May 6, 1900

(Nos. 754, 758, 759), April 28, 1908 (No. 4944); Greenwood, Jackson County, *B. F. Bush*, April 25, 1911 (No. 6436), May 10, 1912 (No. 6681); Dodson, Jackson County, *B. F. Bush*, May 4, 1900 (Nos. 742, 744, 746, 747); Westport, Jackson County, May 22, 1901 (No. 609), May 3, 1912 (No. 6663); Campbell, Dunklin County, *B. F. Bush*, April 20, 1912 (No. 6621), April 22, 1912 (No. 6629), October 6, 1912 (No. 6900); Cockrell, *B. F. Bush*, September 23, 1911 (No. 6482); Cass County, *B. F. Bush*, September 22, 1911 (No. 6470); Grandin, Carter County, *B. F. Bush*, May, 1901 (No. 348); Wayland, Clarke County, *B. F. Bush*, August 22, 1911 (No. 641); Dexter, Stoddard County, *B. F. Bush*, October 9, 1912 (No. 6934); Hannibal, Marion County, *John Davis*, May 4, 1911 (No. 1174), May 7, 1912 (No. 65); Gregory, Clarke County, *John Davis*, May 8, 1912 (No. 73). Oklahoma: Vinita, Cray County, *B. F. Bush*, August 5, 1894 (No. 325). Arkansas: Moark, Clay County, *B. F. Bush*, May 2, 1905 (No. 2585); Fulton, Hempstead County, *B. F. Bush*, April 6, 1909 (No. 5473).

This variety is apparently the most common form in Missouri, and extends to Oklahoma and Arkansas. It sometimes becomes glabrescent and approaches *M. coronaria*, as is the case in Bush's No. 5473 from Fulton, Arkansas. Palmer's Nos. 3349, 3431, 3495, 3599, 3600, 3608, 3616 from Webb City, 3596 from Prosperity, and 3641 from Smithfield have more glabrous and more pointed leaves and hardly represent the typical var. *Palmeri*.

MALUS IOENSIS, var. TEXANA, Rehder, Sargent, *Trees and Shrubs*, ii. 142 (1911).

Blanco, Kendall and Kerr Counties, Texas.

MALUS IOENSIS, var. SPINOSA, *n. var.*

Leaves of the flowering branchlets ovate-oblong to oblong, rounded or cuneate at the base, acute or acutish, serrulate or serrate, or nearly entire, from 1.5 to 3 centimetres long and from 6 to 12 millimetres broad, nearly glabrous or pubescent on the veins beneath; petioles pubescent; leaves of vigorous shoots ovate-oblong, rarely ovate, incisely serrate or lobed with short crenately serrate lobes, from 4 to 6 centimetres long and from 2.5 to 3.5 centimetres broad, those toward the ends of the shoots more or less thinly tomentose below, those at the base pubescent at least on the veins; petioles pubescent or tomentose, usually about 1 centimetre, rarely 1.5 centimetre, in length. Flowers from three to five in umbel-like racemes, about 1.8 centimetres in diameter; pedicels slightly villose or nearly glabrous, from 1.5 to 2.5 centimetres long, furnished with linear caducous bracts and bractlets; calyx-tube slightly villose or nearly glabrous, the lobes slightly villose on the outside, densely villose on the inside, ovate-lanceolate, slightly longer than the tube, ending in a glabrous pointed mucro; petals oval-elliptic, deep or pale pink, the blade about 1 centimetre long and 6 millimetres broad, narrowed into a slender claw about 3 millimetres in length; stamens from ten to twenty; styles pubescent only on their lower third, divided nearly to the base, about as long as the stamens. Fruit depressed-globose, green, slightly viscid, from 2 to 2.5 centimetres in diameter and from 1.8 to 2 centimetres high, with shallow cavities at the base and at the apex, the cavity at the apex corrugated.

A dense bushy shrub, from 1 to 2.5 metres high, with long slender flexible branches armed with numerous straight spines from 1.5 to 3 centimetres long, and branchlets villose or tomentose while young, becoming glabrescent toward the base and purplish brown at the end of their first year, glabrous the second year; bark of the trunk very dark, broken into small thin scales. Winter-buds tomentose, the inner scales accrescent and tridentate at the apex. Flowers appearing the end of April. Fruit ripening in October.

Missouri: *B. F. Bush*, Campbell, Dunklin County, April 22, 1912 (Nos. 6630, type, 6631), April 18, 1912 (Nos. 6553, 6561), *B. F. Bush* and *C. S. Sargent*, October 6, 1912 (No. 6850).

This variety resembles somewhat *M. coronaria* Miller, but is easily distinguished by its pubescence, by the serrulate or serrate leaves, and by the lobed ovate leaves of the shoots, which are pubescent below at maturity. It is more nearly related to *M. ioensis*, var. *Palmeri* Rehder, but differs chiefly in its shrubby habit, smaller leaves and flowers, and glabrescent calyx. Nos. 6561 and 6631 differ from the type in their somewhat more pubescent and more sharply serrate leaves and in their lighter-colored flowers.

MALUS IOENSIS, var. CRENISERRATA, *n. var.*

Leaves elliptic-ovate to oblong-ovate, rounded or broadly cuneate at the base, acute, crenate-serrate, often slightly so, the smaller leaves nearly entire, those of vigorous shoots nearly doubly serrate, from 3 to 6 centimetres long, from 1.5 to 2.5 centimetres broad, those of the shoots often ovate, from 4 to 7 centimetres long and from 2.5 to 4 centimetres broad, bright green above, light green beneath, those of the flowering branchlets glabrous or nearly so except on the veins below, those of the shoots tomentose beneath when unfolding, at maturity thinly villose; petioles from 5 to 12 millimetres long, always tomentose. Flowers from three to five, on villose pedicels about 2 centimetres in length; calyx-tube tomentose on the outside, sometimes thinly so; calyx-lobes lanceolate, slightly longer than the tube, tomentose on both surfaces, ending in a glabrous acute mucro; petals oval, abruptly contracted into a slender claw from 3 to 4 millimetres long, the blade from 1.3 to 1.5 centimetres long and from 1 to 1.2 centimetres broad; stamens about one-third shorter than the petals; styles slightly shorter than the stamens, villose below the middle, connate for about one-third of their length. Fruit depressed-globose, from 2 to 2.5 centimetres high and from 2.5 to 3 centimetres in diameter, cavities at base and apex rather shallow.

A tree, with slender spineless branches villose when young.

Louisiana: Pineville, La Salle Parish, *C. S. Sargent*, April 3, 1885 (type), *R. S. Cocks*, September, 1912; Crowley, Acadia Parish, *J. G. Haupt*, September, 1912 (Nos. 1 and 2).

The leaves of the flowering branches in shape and texture resemble those of *M. lancifolia* Rehder, but they are pubescent beneath, at least on the veins, and have densely villose petioles; and the tomentose calyx and the generally ovate leaves of the shoots which are thinly villose below at maturity readily distinguish it from *M. lancifolia*. The broad, not lobed, only doubly serrate leaves of the shoots resemble those of *M. ioensis*, var. *texana*, but they are larger and less densely tomentose.

MALUS IOENSIS, var. BUSHII, *n. var.*

Leaves oblong-ovate, rounded or broadly cuneate at the base, acute, shallowly serrate or sometimes crenately serrate, less often doubly serrate or slightly lobed, from 5 to 10 centimetres long and from 2.5 to 4.5 centimetres broad, those on vigorous shoots oblong-ovate to ovate, often lobed with from two to five pairs of short and broad coarsely serrate lobes, from 7 to 11 centimetres long and from 5 to 7 centimetres broad; at maturity those of the vigorous shoots thinly villose beneath particularly on the veins, the others glabrous or nearly so; petioles from 1.5 to 3 centimetres in length. Flowers in from four- to six-flowered clusters, on slender villose or sometimes glabrescent pedicels; calyx more or less densely villose on the outside, rarely whitish tomentose; calyx-lobes lanceolate, slightly longer than the tube, gradually narrowed into an elongated glabrous mucro; petals oval, abruptly narrowed into slender claws, the blade 1.5 to 1.8 centimetres long and 1.2 to 1.4 centimetres broad; stamens about two-thirds as long as the petals or somewhat shorter; styles slightly longer than the stamens, villose at the base for one-third of their length. Fruit depressed-globose, with a very shallow cavity at the base and a slight cavity at the apex, sometimes irregularly and rather deeply grooved, from 2.5 to 3 centimetres high and from 3 to 3.5 centimetres in diameter, green and viscid.

Branchlets thinly tomentose while young, particularly toward the apex, becoming purplish or grayish brown the second year; the older branches often furnished with spines from 1 to 4 centimetres long.

Missouri: Williamsville, Wayne County, *B. F. Bush*, April 24, 1912 (No. 6634, type), October 10, 1912 (No. 6951 a), April 29, 1902 (No. 1465); Monteer, Shannon County, *B. F. Bush*, October 20, 1911 (No. 6518), April 27, 1912 (No. 6656).

This variety differs from the type in its less deeply lobed and glabrescent leaves. It is nearest to var. *Palmeri* Rehder, but is easily distinguished by its oblong-lanceolate acute less pubescent leaves. The leaves of the flowering branchlets and short branchlets resemble those of *M. lancifolia* Rehder, but that species differs in the glabrous calyx and in the leaves being pubescent only while very young. The flowers from Monteer differ from those of the type of this variety in their shorter pedicels and broader erose-denticulate petals.

ALFRED REHDER.

EXPLANATION OF THE PLATE.

PLATE CLXXXIX. MALUS PLATYCARPA.

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A petal, enlarged.
4. A fruiting branch, natural size.
5. Vertical section of a fruit, natural size.

C. E. Faxon del.

MALUS PLATYCARPA, Rehd.

CRATÆGUS PERSISTENS, SARG.

(Crus-galli.)

CRATÆGUS PERSISTENS, Sargent, *n. sp.*

Leaves lanceolate to oblong-obovate, acuminate at the ends and coarsely often doubly serrate above the middle; nearly fully grown when the flowers open and then thin, yellow-green, very lustrous and slightly hairy especially along the midribs above, and pale bluish green and glabrous below, and at maturity coriaceous, dark green and lustrous on the upper surface, paler on the lower surface, from 5 to 6.5 centimetres long and from 2 to 2.5 centimetres wide, with thin prominent midribs and primary veins; petioles stout, wing-margined to below the middle, slightly villose on the upper side while young, soon glabrous, from 1 to 1.5 centimetres in length; stipules linear to linear-obovate, acuminate, slightly falcate, glandular-serrate, conspicuous, persistent until after the petals fall; leaves on vigorous shoots often from 7 to 8 centimetres long and from 4 to 4.5 centimetres wide. Flowers 2 centimetres in diameter, on long slender slightly villose pedicels, in broad open mostly from 12- to 15-flowered corymbs, the much elongated lower peduncles from the axils of upper leaves; calyx-tube narrowly obconic, glabrous, the lobes long, slender, acuminate, glandular-serrate above the middle, or nearly entire, glabrous on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers white; styles 2 or 3, surrounded at the base by a broad ring of pale tomentum. Fruit ripening in October and persistent without change of color late into the winter, on slender glabrous pedicels, in gracefully drooping many-fruited clusters, short-oblong or slightly obovate, truncate and sometimes slightly depressed at the apex, rounded at the base, crimson, not lustrous, marked by large dark dots, about 1.5 centimetres long and broad; calyx little enlarged, with a narrow deep cavity pointed in the bottom, and small spreading lobes; flesh thick, light yellow, mealy, of good flavor; nutlets 2 or 3, narrowed and rounded at the ends, rather broader at the base than at the apex, rounded and ridged on the back with a high narrow ridge, from 7.5 to 8 millimetres long and 3.5 millimetres wide.

A low flat-topped tree (in the Arnold Arboretum 3 or 4 metres high), with a short stout trunk 2.5 decimetres in diameter, covered with dark gray-brown scaly bark, large wide-spreading smooth pale gray branches, and stout only slightly zigzag branchlets, light orange-green and slightly villose when they first appear, soon glabrous, becoming light orange-brown and lustrous during their first season and dull gray-brown the following year, and armed with numerous stout straight light chestnut-brown shining spines from 3 to 5.5 centimetres long. Flowers the middle of June. Fruit ripens in November.

The origin of this plant is unknown. It was raised at the Arnold Arboretum from seeds sent in 1876 from the Muséum d'Histoire Naturelle in Paris under the name of *Cratægus lobata.* The *Cratægus lobata* cultivated at the Muséum in 1887 and in the Arboretum Segrezianum as *Cratægus Loddigesiana* is not the *C. lobata* Bosc, which is one of the Flava Group from the southern United States, but probably should be referred to *Cratægus stipulosa* Steudel, a Mexican species with densely tomentose corymbs, leaves slightly lobed above the middle and more or less villose during the season, especially on the midribs and veins. The fruit of the Mexican plant and its pedicels, moreover, are hairy and the spines are much lighter in color. It is possible that the seeds sent to the Arboretum had been gathered from the plant cultivated at the Muséum as *Cratægus lobata* and that they had been influenced by pollen from a Crus-galli species. *Cratægus persistens* looks more like the plants of the Crus-galli Group than like *Cratægus stipulosa*, but the fact that it holds its leaves very late in the autumn without change of color points to Mexican origin, for this is certainly

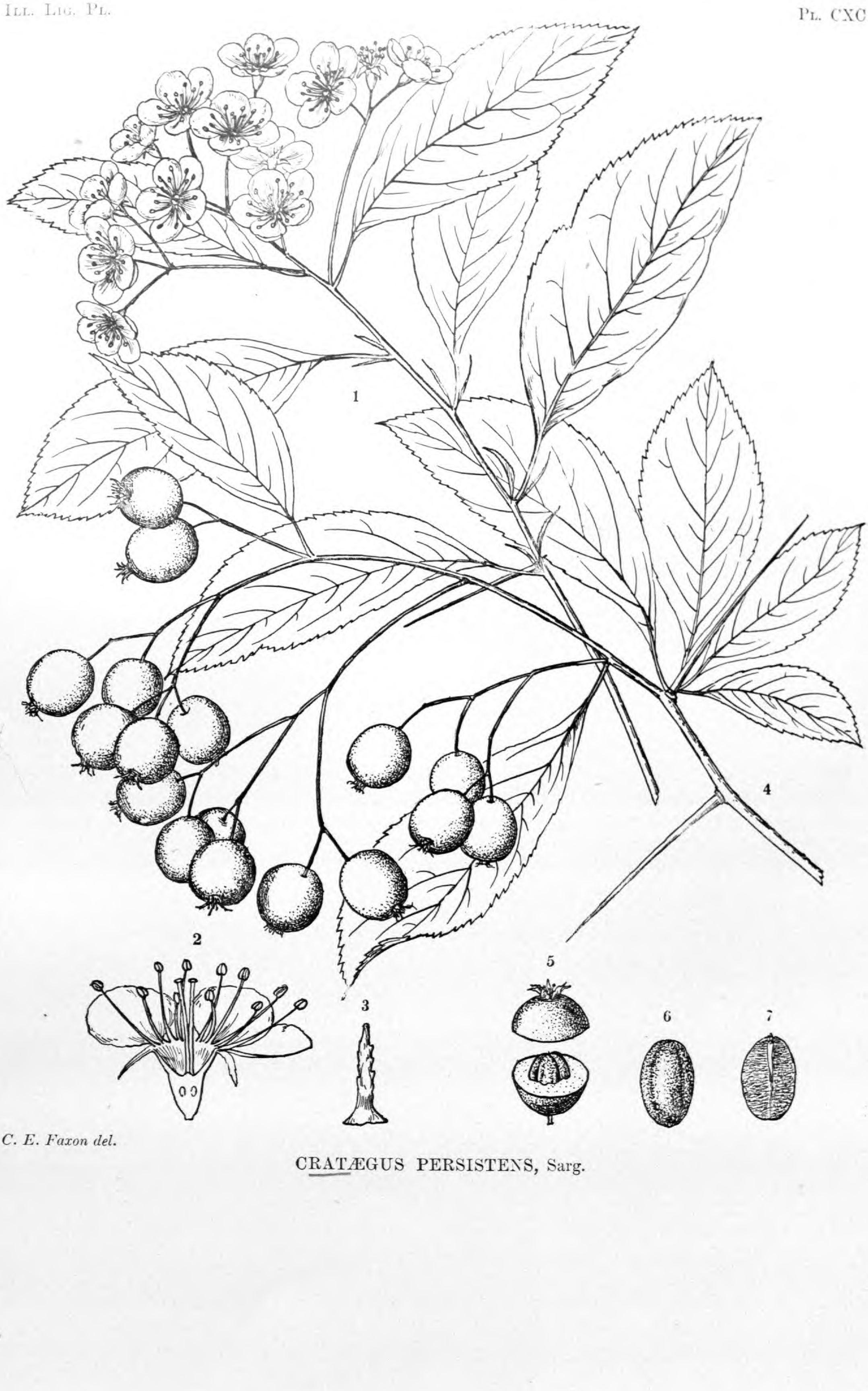
a New World plant and unlike any species yet found in the territory of the United States. On the other hand its perfect hardiness in New England would seem to indicate that it had originated in a more northern region than Mexico, although *Cratægus Carrierei* Koehne, another plant of uncertain origin which sprang up several years ago in the nursery of the Muséum at Paris and which has every appearance of being either a Mexican species or the hybrid of a Mexican species, is as hardy in New England as *Cratægus persistens*. But whatever its origin may have been, *Cratægus persistens* is an ornamental plant of high order. It retains its leaves as green as they were in summer after those of all the other Hawthorns have fallen, and the fruit, unchanged in color and perfectly solid, remains on the branches long after Christmas, making it the most conspicuous of all the winter-fruiting plants which are hardy in New England.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXC. CRATÆGUS PERSISTENS.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A calyx-lobe, enlarged.
4. A fruiting branch, natural size.
5. A fruit laid open transversely.
6. A nutlet, dorsal view, enlarged.
8. A nutlet, ventral view, enlarged



C. E. Faxon del.

CRATÆGUS PERSISTENS, Sarg.

CRATÆGUS PEREGRINA, SARG.

CRATÆGUS PEREGRINA, *n. sp.*

Leaves ovate, acuminate, abruptly cuneate at the broad base, slightly doubly serrate with straight glandular teeth, and divided into 5 or 6 pairs of narrow acuminate lateral lobes; more than half-grown when the flowers open and then thin, yellow-green and roughened above by short white hairs and densely coated below with hoary tomentum, and at maturity thin, dark yellow-green, smooth and glabrous on the upper surface, paler and villose on the lower surface, especially on the slender midribs, and primary veins extending obliquely to the points of the lobes, from 5 to 7 centimetres long and from 3.5 to 6 centimetres wide; petioles slender, coated with long matted pale hairs persistent through the season, from 2 to 3.5 centimetres in length; stipules foliaceous, acuminate, glandular-serrate, falcate, mostly persistent until after the petals fall; leaves on vigorous shoots ovate to oblong-ovate, acute or acuminate, rounded, abruptly cuneate or truncate at the broad base, often from 8 to 10 centimetres long and from 6 to 8 centimetres wide. Flowers from 1.8 to 2 centimetres in diameter, on short stout densely villose pedicels, in compact hairy mostly from 15- to 20-flowered corymbs, their bracts and bractlets oblong-obovate, acuminate, glandular-serrate, scarious, early deciduous; calyx-tube broadly obconic, thickly coated with pale hairs, the lobes short, nearly triangular, entire or occasionally glandular-serrate near the middle, densely villose on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens 20; anthers pale yellow; styles 5 or rarely 6, surrounded at the base by a narrow ring of short pale hairs. Fruits on slender villose pedicels, in many-fruited drooping clusters, broadly ovate, narrowed and rounded at the tomentose apex, rounded and pubescent at the base, dark dull purple marked by small pale dots, about 1.5 centimetres long and nearly as broad; calyx slightly enlarged, with a short tube, a deep narrow cavity pointed and tomentose in the bottom, and erect lobes more or less incurved above the middle, tomentose on the outer surface and dark red on the inner surface; flesh thick, succulent, yellow, slightly tinged with red, of good flavor; nutlets 5 or rarely 6, gradually narrowed and rounded at the ends, thicker at the apex than at the base, rounded and irregularly ridged or slightly grooved on the back, from 5 to 6 millimetres long and from 4 to 4.5 millimetres wide, the narrow conspicuous hypostyle extending to the middle of the nutlet.

A shrubby tree, 4 or 5 metres high, with a stem 2 decimetres in diameter, erect branches and stout only slightly zigzag branchlets marked by large pale lenticels, thickly coated when they first appear with matted white hairs, becoming during their first season light chestnut-brown, lustrous, and sparingly villose and dull gray-brown the following year, and armed with straight slender chestnut-brown spines from 1.5 to 2 centimetres long. Flowers from the 1st to the middle of May. Fruit ripens from the middle of August and remains several weeks on the branches before falling.

The native country of this plant is unknown to me. It was raised at the Arboretum from seeds received from the Imperial Botanic Garden at St. Petersburg in 1880 as *C. melanocarpa*. It differs from that species in the shape of the more hairy leaves, in its larger flowers, in the color of the anthers and in the color of the much larger and early-ripening fruit. In foliage it resembles some of the forms of *Cratægus nigra* Waldstein & Kitaibel, and the inflorescence of the two plants is not unlike, but the small globose black fruits of *Cratægus nigra* are entirely unlike those of *C. peregrina*. The color of the fruit resembles that of *Cratægus Lambertiana* Lange, but the leaves of that species are glabrous. *Cratægus peregrina* appears to be a true Mollis, and is therefore particularly interesting as the only

Old World representative yet described of a group which is widely distributed in the eastern United States in many forms.[1]

[1] Descriptions of the following American species are added: —

CRATÆGUS PALLIATA, *n. sp.* (*Crus-galli.*)

Leaves oval to obovate, acute or acuminate, concave cuneate at the entire base, coarsely doubly serrate with straight glandular teeth, and on vigorous shoots slightly lobed; about half-grown when the flowers open and then thin, light yellow-green, roughened above by short white hairs and pale and covered below with short hairs most abundant on the midribs and veins, and at maturity subcoriaceous, dark green, smooth, glabrous and lustrous on the upper surface, villose-pubescent on the lower surface, from 6 to 8 centimetres long and from 3.5 to 5.5 centimetres wide, with stout midribs and thin prominent primary veins; petioles stout, broadly wing-margined to below the middle, densely villose early in the season, becoming glabrous, 6 or 7 centimetres in length. Flowers about 1.8 centimetres in diameter, on slender villose pedicels, in generally from ten- to twelve-flowered hairy corymbs; calyx-tube narrowly obconic, densely coated with matted pale hairs, the lobes gradually narrowed from wide bases, slender, acuminate, finely glandular-serrate below the middle, villose, reflexed after anthesis; stamens ten; anthers dark rose color or purple; styles from two to five, surrounded at the base by a ring of long white hairs. Fruit subglobose, deep dark red, lustrous, marked by pale dots, about 2 centimetres in diameter; flesh thick, soft and succulent; nutlets usually from three to five, rounded at the base, narrowed and sometimes acute at the apex, irregularly ridged on the back with a grooved ridge, from 7 to 8 millimetres long and about 4 millimetres wide, the narrow light-colored hypostyle extending to the middle of the nutlet.

A tree, sometimes 7 metres high, with stout very zigzag branchlets thickly coated when they first appear with long matted white hairs, becoming glabrous, light chestnut-brown and very lustrous during their first season and pale gray-brown the following year, and armed with many stout nearly straight chestnut-brown shining spines from 6 to 8 centimetres in length. Flowers toward the end of April. Fruit ripens in October.

Arkansas: rich moist bottom-lands near Fulton, Hempstead County, *B. F. Bush*, April 21, 1905 (No. 14, type); Miller County, *B. F. Bush*, November 12, 1905 (No. 14 B).

CRATÆGUS TRIUMPHALIS, *n. sp.* (*Crus-galli.*)

Leaves oblong-ovate, acute and often short-pointed at the apex, gradually narrowed and concave-cuneate at the base, and finely serrate above the middle with straight teeth; nearly fully grown when the flowers open and then thin, yellow-green and clothed above with soft white hairs and blue-green and glabrous below with the exception of a few hairs along the midribs, and at maturity subcoriaceous, glabrous, dark green and very lustrous on the upper surface, paler on the lower surface, from 4 to 5 centimetres long and from 2 to 3 centimetres wide, with thin midribs and slender prominent primary veins; petioles slender, narrowly-wing-margined to below the middle, densely villose early in the season, becoming glabrous, from 5 to 6 millimetres in length; leaves on vigorous shoots broad-obovate, rounded at the apex, coarsely serrate, often from 5 to 6 centimetres long and from 3 to 3.5 centimetres wide. Flowers from 2.3 to 2.5 centimetres in diameter, on slender villose pedicels, in few-flowered hairy corymbs; calyx-tube narrowly obconic, villose with scattered pale hairs most abundant near the base, the lobes slender, acuminate, entire, glabrous on the outer surface, villose on the inner surface; stamens ten; anthers pale rose color; styles two or three, usually two. Fruit on slender drooping pedicels, ovate or short-oblong, full and rounded at the ends, crimson often tinged with green, lustrous, marked by numerous small pale dots, from 1 to 1.5 centimetres long, and from 8 to 10 millimetres in diameter; calyx little-enlarged, with a deep narrow cavity pointed in the bottom, and spreading reflexed lobes; flesh thin, yellow-green, dry, hard and mealy; nutlets two or three, rounded at the ends, broader at the apex than at the base, ridged on the back with a high grooved ridge, from 6 to 7 millimetres long and about 4 millimetres wide, the narrow prominent hypostyle extending to the middle of the nutlet.

A tree, from 5 to 10 metres high, with a trunk from 8 to 10 centimetres in diameter, covered with rough scaly bark, spreading branches, and slender zigzag branchlets light chestnut-brown and coated when they first appear with long matted pale hairs, nearly glabrous at the end of their first season and pale gray-brown the following year, and armed with very numerous slender nearly straight chestnut-brown shining spines from 2 to 3 centimetres in length. Flowers at the end of April. Fruit ripens in October.

Arkansas: upland woods, near Fulton, Hempstead County, *B. F. Bush*, April 22, 1902 (No. 1401, type), October 12, 1902 (No. 1038), April 28, 1901 (Nos. 222, 223, 224, 227, 243, 599), April 15, 1905 (No. 11, anthers described as "pale salmon color"), November 6, 1905 (No. 11 B).

CRATÆGUS BELLICA, *n. sp.* (*Crus-galli.*)

Leaves erect on the branches, broadly obovate and rounded at the apex, gradually narrowed and cuneate at the base, and finely often doubly serrate usually only above the middle; more than half grown when the flowers open and then villose on the midribs above with hairs persistent during the season, and glabrous below, and at maturity subcoriaceous, dark green and lustrous on the upper surface, pale on the lower surface, from 3.5 to 4 centimetres long and from 2 to 2.5 centimetres wide, with stout midribs, and slender prominent primary veins; petioles stout, narrowly wing-margined to the base, from 6 to 8 millimetres in length, leaves on vigorous shoots obovate, acute and short-pointed at the apex, concave-cuneate at the base, coarsely serrate, often from 6 to 7 centimetres long and 3.5 centimetres wide. Flowers from 1.6 to 1.8 centimetres in diameter, on slender slightly villose pedicels, in compact from six- to fifteen-flowered corymbs; calyx-tube narrowly obconic, glabrous, the lobes short, generally narrowed from the wide base, acute, entire or occasionally dentate below the middle, glabrous on the outer surface, villose on the inner surface, reflexed after anthesis; stamens from five to ten, usually ten; anthers pale pink; styles two. Fruit (immature) short oblong to ovate, rounded at the base, gradually narrowed at the apex, from 1 to 1.2 centimetres long and from 1 to 10 millimetres in diameter; calyx prominent with a broad shallow cavity pointed in the bottom, and reflexed closely appressed lobes; flesh thin, dry and hard; nutlets two, rounded at the base, slightly narrowed and rounded at the apex, ridged on the back with a broad high deeply grooved ridge, from 5 to 7 millimetres long and about 4 millimetres thick, the broad hypostyle extending to about the middle of the nutlet.

A slender tree, with wide-spreading branches, and slender zigzag glabrous light red-brown lustrous branchlets marked by small pale lenticels, and dull gray-brown in their second year, and armed with very numerous straight very stout thorns pointing downward from the branch, chestnut-brown and lustrous during their first season, dull gray the following year, and from 5 to 7 centimetres in length. Flowers in April. Fruit ripens in October.

Arkansas: upland woods, near Fulton, Hempstead County, *B. F. Bush*, April 28, 1901 (Nos. 216, 239, 240, 241), April 22, 1902 (No. 1436, type), August 12, 1901 (No. 673), April 23, 1905 (Nos. 16, 16 B); Miller County, *B. F. Bush*, April 22, 1905 (No. 16 A).

CRATÆGUS UNIQUA, *n. sp.* (*Crus-galli.*)

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves and on the inner surface of the calyx-lobes. Leaves oblong-obovate, acute or occasionally rounded at the apex, gradually narrowed to the long cuneate base, and finely serrate above the middle with straight or incurved glandular teeth; more than half-grown when the flowers open, and then sparingly villose along the midribs above, and at maturity thin but firm in texture, dark green and very lustrous above, paler below, from 3.5 to 4 centimetres long and from 1 to 1.5 centimetres wide, with thin midribs, and slender primary veins mostly within the parenchyma; petioles slender, from 4 to 5 millimetres in length; leaves on vigorous shoots broadly obovate, rounded or acute at the base, more coarsely serrate, from 5 to 6 centimetres long and from 2.5 to 3 centimetres wide, with thicker midribs and more prominent veins. Flowers from 1 to 1.2 centimetres in diameter, on slender pedicels, in mostly from five- to eight-flowered corymbs; calyx-tube narrowly obconic, the lobes short and broad, acuminate, entire or slightly dentate near the middle, sparingly villose on the inner surface, reflexed after anthesis; stamens twenty; anthers white; styles two or three. Fruit on slender drooping pedicels, short-oblong, rounded at the ends, dull red, from 1 to 1.2 centimetres long, and from 7 to 8 millimetres in diameter; calyx prominent with a deep wide cavity broad in the bottom, and reflexed closely appressed persistent lobes still slightly villose on the inner surface; flesh thin, dry and hard; nutlets two or three, broad and rounded at the base, narrowed at the apex, ridged on the back with a high wide grooved ridge, from 6 to 7 millimetres long and from 3 to 4 millimetres wide, the broad conspicuous hypostyle extending to below the middle of the nutlet.

A slender tree, with wide-spreading branches forming a flat head, and slender slightly zigzag orange or red-brown branchlets unarmed or furnished with thin straight or slightly curved dark chestnut-brown shining spines from 1 to 2 centimetres long. Flowers the middle of April. Fruit ripens in October.

Texas: low sandy woods near Marshall, Harrison County, *B. F. Bush* and *C. S. Sargent*, April 19, 1901 (type), *B. F. Bush*, August 8 (No. 623) and October 10, 1901 (No. 1032).

This species is interesting as the only Crus-galli species with twenty white or yellow anthers and glabrous corymbs from the region west of the Mississippi River. *C. arborea* Beadle from Alabama has a glabrous corymb and twenty yellow anthers.

CRATÆGUS CERASOIDES, *n. sp.* (*Æstivales.*)

Leaves obovate, acute, gradually narrowed, cuneate and entire at the base, and coarsely often doubly serrate above with straight or incurved glandular teeth; when they unfold tinged with red and villose above and on the midribs; more than half-grown when the flowers open, and then thin, dull bluish green and scabrate or smooth on the upper surface, and glabrous with the exception of a few axillary persistent tufts of brown hairs on the lower surface, and at maturity subcoriaceous, dark green, smooth and very lustrous above, paler below, from 3 to 3.5 centimetres long and from 1.5 to 2 centimetres wide, with thin midribs and primary veins; petioles slender, narrowly wing-margined to below the middle, from 6 to 10 millimetres in length; leaves on vigorous shoots oblong-obovate, acuminate, abruptly cuneate or rounded at the wide base, coarsely serrate, more or less deeply divided into broad acuminate lateral lobes and often from 5 to 6 centimetres long and from 3 to 4 centimetres wide, with stout broad-winged slightly glandular petioles. Flowers from 2 to 2.2 centimetres in diameter, on long slender glabrous pedicels, in mostly four- or five-flowered corymbs; calyx-tube narrowly obconic, glabrous, the lobes gradually narrowed, long, slender, acuminate or minutely serrate near the middle, glabrous on the outer surface, slightly villose on the inner surface, reflexed after anthesis; stamens twenty; anthers dark rose color; styles five, surrounded at the base by a broad ring of white tomentum. Fruit on long drooping pedicels, in usually one or two fruit clusters, subglobose to short-oblong, bright cherry red, about 1.5 centimetres in diameter; calyx little enlarged with a deep narrow cavity wide in the bottom, and spreading and appressed lobes red on the upper side; flesh thick, yellow, sweet, soft, of good flavor; nutlets five, thin and rounded at the ends, rounded and slightly grooved on the back, about 5 millimetres long and 3 millimetres wide, the narrow prominent hypostyle extending to the middle of the nutlet.

A shrub, with a broad round-topped head sometimes from 12 to 14 metres across, numerous large erect and spreading stems often 10 metres high, covered with smooth pale bark separating into thin flake-like scales, and in falling disclosing the brown-gray inner bark, and slender nearly straight glabrous branchlets light orange-brown and marked by pale lenticels when they first appear, becoming dark dull purple before the end of their first season and dull reddish brown the following year, and armed with slender straight spines from 3 to 3.5 centimetres in length. Flowers the middle of March. Fruit ripens late in July and in August.

Florida: low, wet, often inundated prairies, near Seville, Volusia County, *A. H. Curtiss*, June and July, 1901 (No. 6842, type), *C. S. Sargent*, March 18, 1908 (No. E).

The beautiful fruit of this species, which is largely collected and used in jellies, reminded Mr. Curtiss of red cherries. Its late ripening is unusual for a species of the Æstivales, of which this is probably the largest and handsomest species.

CRATÆGUS MONANTHA, *n. sp.* (*Æstivales.*)

Glabrous with the exception of the hairs on the young leaves and calyx-lobes. Leaves obovate, rounded or acute at the apex, concave-cuneate at the base, and finely crenately serrate usually only above the middle; when they unfold sparingly villose above and in the axils of the leaves below, about one-third grown when the flowers open, and at maturity coriaceous, dark yellow-green, glabrous and very lustrous on the upper surface, pale yellow-green and still hairy in the axils of the veins on the lower surface,

from 1 to 2 centimetres long and about 1 centimetre wide, with slender midribs and obscure primary veins; petioles slender, wing-margined, from 2 to 3 millimetres in length; leaves on vigorous shoots broadly ovate, acute at the apex and cuneate at the base, or semiorbicular and rounded at the ends, sometimes slightly or deeply three-lobed, and often from 1.8 to 2 centimetres long and broad, their stipules acuminate, foliaceous, coarsely glandular-serrate, from 2 to 3 millimetres in length, persistent. Flowers from 2 to 2.2 centimetres in diameter, on slender pedicels, in one- or very rarely near the ends of the branches in two- or three-flowered corymbs; calyx-tube broadly obconic, the lobes oblong, abruptly narrowed and apiculate at the apex, finely glandular-serrate near the middle, slightly villose on the inner surface, reflexed after anthesis; stamens twenty; anthers dark rose color; styles five. Fruit on slender erect or spreading pedicels, subglobose to short-oblong, cherry-red, from 8 to 10 millimetres in diameter; calyx prominent with a wide deep cavity pointed and pubescent in the bottom and erect incurved coarsely serrate lobes; nutlets five, rounded at the ends, broader at the apex than at the base, rounded and slightly grooved on the back, about 5 millimetres long and from 3 to 3.5 millimetres wide, the broad conspicuous hypostyle extending nearly to the base of the nutlet.

A shrub, from 1 to 2 metres high, with slender ashy-gray stems, and slender conspicuously zigzag branchlets light orange-brown when they first appear, becoming bright chestnut-brown and lustrous in their second season and dull gray-brown the following year, and armed with numerous slender nearly straight chestnut-brown shining spines from 1.5 to 3 centimetres long. Flowers the middle of March. Fruit ripens the middle of July.

Florida: borders of low wet often inundated prairies near Seville, Volusia County, common; *A. H. Curtiss*, July 16, 1900 (No. 6703, type), July 9, 1900 (No. 6703A, 6703B, also M^1, M and M^2 without date), *C. S. Sargent*, March 18, 1908 (M).

This beautiful little shrub is of considerable interest as the only dwarf species of the Æstivales Group now known. The solitary flowers, too, are unusual in the plants of this group.

CRATÆGUS AMICALIS, *n. sp.* (*Viridis.*)

Leaves oblong-obovate, broad and rounded or abruptly narrowed and acute at the apex, cuneate and often unsymmetrical at the base, and sharply doubly serrate above the middle with straight glandular teeth; nearly fully grown when the flowers open and then pale yellow-green and roughened above by short white hairs and glaucescent below with villose midribs and veins, and at maturity thick and firm in texture, yellow-green, smooth, lustrous and glabrous on the upper surface, paler and slightly hairy on the prominent midribs and primary veins on the lower surface, from 2.5 to 3 centimetres long and from 2 to 2.4 centimetres wide; petioles stout, wing-margined to below the middle, more or less thickly covered with pale hairs early in the season, becoming glabrous, about 1 centimetre in length; leaves on vigorous shoots oval to oblong-obovate, acute, sometimes slightly lobed above the middle, more coarsely serrate, and sometimes from 4 to 5 centimetres long and 3 centimetres wide. Flowers from 1.6 to 1.8 centimetres in diameter, on very slender villose pedicels, in wide from five- to twelve-flowered hairy corymbs; calyx-tube broadly obconic, villose at the base, the lobes short, gradually narrowed from wide bases, acuminate, entire or minutely glandular-dentate, slightly hairy on the outer surface, villose on the inner surface, reflexed after anthesis; stamens twenty; anthers yellow; styles five, surrounded at the base by a narrow ring of yellowish white hairs. Fruit on slender drooping pedicels, subglobose, dull red, from 6 to 8 millimetres in diameter; calyx prominent with a deep broad cavity wide in the bottom, and spreading lobes; flesh dry and hard; nutlets five, rounded at the ends, rather broader at the apex than at the base, irregularly ridged on the back with a narrow low deeply grooved ridge, from 5 to 6 millimetres long and 3 millimetres wide, the broad conspicuous hypostyle extending to below the middle of the nutlet.

A tree, from 5 to 8 metres high, with a trunk sometimes 2.5 decimetres in diameter, and slender slightly zigzag branchlets covered when they first appear with long matted white hairs, dull chestnut-brown and nearly glabrous at the end of their first season and gray-brown in their second year, and armed with occasional slender straight ashy-gray spines from 2 to 3 centimetres in length. Flowers late in April. Fruit ripens in October.

Arkansas: upland woods, near Fulton, Hempstead County, *B. F. Bush*, April 24, 1902 (No. 1420, type), October 18, 1901 (No. 1104), April 25 and November 8, 1905 (No. 17?).

CRATÆGUS VELUTINA, *n. sp.* (*Viridis.*)

Leaves ovate to obovate, acute or rounded at the apex, gradually narrowed and cuneate at the entire base, and sharply often doubly serrate with straight glandular teeth; more than half grown when the flowers open and then dark yellow-green and covered above by short white hairs most abundant on the midribs and veins, and coated below with hoary pubescence, and at maturity smooth, lustrous and glabrous on the upper surface and covered below with matted white hairs, from 4 to 5 centimetres long and from 2.5 to 3 centimetres wide, with thin midribs and primary veins; petioles slender, thickly covered early in the season with matted pale hairs, becoming glabrous; leaves on vigorous shoots ovate, rounded or broadly cuneate at the base, acute at the apex, coarsely serrate, and often from 4.5 to 5 centimetres long and from 3.5 to 5 centimetres wide. Flowers 1.2 centimetres in diameter, on slender villose pedicels, in mostly from seven- to twelve-flowered hairy corymbs; calyx-tube narrowly obconic, villose, the lobes gradually narrowed from broad bases, short, acute, entire, slightly villose; stamens twenty; anthers canary yellow; styles five. Fruit on slender drooping glabrous or nearly glabrous pedicels, subglobose, orange-red, marked by small pale dots, from 6 to 7 millimetres in diameter; calyx prominent, with a deep narrow cavity pointed in the bottom, and closely appressed lobes; flesh thin, yellow, dry and mealy; nutlets five, acute at the base, rounded at the apex, ridged on the back with a low grooved ridge, about 4 millimetres long and 2.3 millimetres wide, the broad hypostyle extending to below the middle of the nutlet.

A tree, from 2 to 6 metres high, with a trunk sometimes 2 decimetres in diameter, covered with dark rough scaly bark, and slender slightly zigzag branchlets hoary tomentose when they first appear, light red-brown, lustrous and marked by pale lenticels at the end of their first season and ashy-gray the following year, and armed with slender nearly straight chestnut-brown spines from 2 to 3.5 centimetres in length. Flowers the end of April. Fruit ripens in October.

Arkansas: upland woods, in dry soil, near Fulton, Hempstead County, *B. F. Bush*, April 25 and November 8, 1905 (No. 10C,

type), April 29 and October 15, 1901 (No. 16), April 25, 1902 (No. 16A), *C. S. Sargent*, April 23, 1901 (No. 16), *B. F. Bush*, April 26 and 29, and October 15, 1901, April 25, 1902 (Nos. 11, 151), April 28, 1901 (No. 63).

The following specimens in flower collected at Fulton, with more acute leaves, probably all belong to this species: *B. F. Bush*, April 23, 1902 (No. 16), April 14, 1905 (Nos. 10, 10A and 10B).

CRATÆGUS ENUCLEATA, *n. sp.* (*Viridis.*)

Glabrous with the exception of the hairs on the young leaves and petioles. Leaves oval to ovate or slightly obovate, acute or acuminate and gradually narrowed and cuneate at the base, finely serrate usually only above the middle with straight or incurved glandular teeth, and sometimes slightly lobed toward the apex; when they unfold bright red and covered above and on the petioles with caducous white hairs, and furnished below with large axillary clusters of hairs often persistent through the season; more than half grown when the flowers open, and at maturity thin, yellow-green and lustrous on the upper surface, paler on the lower surface, from 3.5 to 4 centimetres long and from 2 to 2.5 centimetres wide; petioles slender, narrowly wing-margined nearly to the middle, from 6 to 12 millimetres in length; leaves on vigorous shoots ovate, acute and short-pointed at the apex, rounded or abruptly cuneate at the broad base, coarsely doubly serrate, often slightly lobed, subcoriaceous, frequently 6 or 7 centimetres long and wide, with stout petioles from 3 to 3.5 centimetres in length. Flowers about 1 centimetre in diameter, on long slender pedicels, in wide many-flowered corymbs; calyx-tube narrowly obconic, the lobes slender, acuminate, entire, reflexed after anthesis; stamens twenty; anthers rose-colored; styles four or five, usually five. Fruit on slender drooping pedicels, subglobose to short-oblong, orange-red, lustrous, from 7 to 8 millimetres in diameter; calyx little enlarged, with a deep narrow cavity pointed in the bottom, and reflexed closely appressed persistent lobes; flesh thin, dry and mealy; nutlets four or five, rounded at the apex, acute at the base, slightly grooved on the back, 5 millimetres long and from 3 to 3.5 millimetres wide, the broad hypostyle extending to below the middle of the nutlet.

A slender tree, from 7 to 8 metres high, with small nearly straight branchlets light reddish brown when they first appear, becoming bright chestnut-brown and lustrous during their first season, and dull light gray-brown the following year, and unarmed or rarely furnished with small chestnut-brown spines. Flowers the middle of April. Fruit ripens late in October.

Arkansas: upland woods, near Fulton, Hempstead County, common, *B. F. Bush* and *C. S. Sargent*, April 18, 1901 (No. 14, type), *B. F. Bush*, August 13 and October 17, 1901 (No. 14B), October 12, 1901 (No. 14), October 17, 1901 (No. 14C).

CRATÆGUS KELLERMANII, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves. Leaves ovate, acuminate, gradually or abruptly narrowed and cuneate at the entire base, finely often doubly serrate above with straight glandular teeth, and divided above the middle into four or five pairs of short acute spreading lobes; more than half-grown when the flowers open and then thin, yellow-green above and glaucescent below, and at maturity thick, dull blue-green and lustrous on the upper surface, paler on the lower surface, from 5 to 6 centimetres long and from 4 to 4.5 centimetres wide, with thin midribs, and slender primary veins; petioles slender, wing-margined at the apex, from 2 to 3 centimetres in length; stipules linear to linear-obovate, acuminate, glandular with small stipitate glands, persistent until the flowers open. Flowers about 1.5 centimetres in diameter, on short slender pedicels, in small compact mostly from seven- to nine-flowered corymbs; calyx-tube narrowly obconic, the lobes slender, acuminate, entire, reflexed after anthesis; stamens twenty; anthers pink; styles from two to five, usually three or four. Fruit on long spreading or drooping pedicels, subglobose but often broader than high, angled, red more or less tinged with green, pruinose, from 1.4 to 1.8 centimetres in diameter; calyx little enlarged, with a narrow deep cavity broad in the bottom, and small spreading closely appressed lobes; flesh thin, yellow, dry and mealy; nutlets usually three or four, rounded at the ends, broader at the apex than at the base, ridged on the back with a high broad deeply grooved ridge, from 7 to 7.5 millimetres long and from 4 to 4.5 millimetres wide, the broad hypostyle extending to the middle of the nutlet.

A shrub, with slender zigzag branchlets light reddish brown and marked by pale lenticels when they first appear, orange-brown at the end of their first season and dark gray-brown the following year, and armed with slender slightly curved chestnut-brown shining spines, from 3.5 to 4 centimetres in length.

Ohio: Dennison, Tuscarawas County, *W. A. Kellerman*, May 25 and October 22, 1901 (Nos. 99, type, 91, 103).

This species is named for the late W. A. Kellerman, the distinguished Professor of Botany in the University of Ohio, who a few years before his death had begun to collect and study the numerous species of Cratægus of central Ohio.

CRATÆGUS SECLUSA, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of the hairs on the unfolding leaves and on the inner surface of the calyx-lobes. Leaves ovate, acuminate, truncate, rounded or abruptly cuneate at the broad base, coarsely doubly serrate with glandular teeth, and divided usually only above the middle into short broad lobes; when they unfold slightly hairy above with caducous hairs and glabrous below, and at maturity thin but firm in texture, smooth and dull yellow-green on the upper surface, rather paler on the lower surface, from 4.5 to 5 centimetres long and from 3.5 to 5 centimetres wide, with prominent midribs, and thin primary veins running to the points of the lobes; petioles slender, glandular early in the season with mostly deciduous glands, from 1 to 1.5 centimetres in length; stipules linear-obovate, conspicuously glandular, caducous. Flowers 2.5 centimetres in diameter, on slender pedicels in small compact from five- to seven-flowered corymbs; calyx-tube broadly obconic, the lobes separated by wide sinuses, gradually narrowed from the base, short, acuminate, serrate near the middle, sparingly villose on the inner surface, reflexed after anthesis; stamens twenty; anthers pink; styles four or five, surrounded at the base by a broad ring of pale tomentum. Fruit on short erect pedicels, subglobose, broader than high, conspicuously angled, flattened at the apex, sometimes abruptly cuneate at the base, light orange-red often blotched with green, marked by many small dark dots, from 1.3 to 1.5 centimetres broad and from 1.1 to 1.3 centimetres high; calyx with a short tube, and a broad shallow cavity wide in the bottom; flesh thick, green, dry and mealy;

nutlets four or five, broad and rounded at the ends, wider at the apex than at the base, ridged on the back with a broad high rounded ridge, from 7 to 8 millimetres long and from 6 to 7 millimetres wide, the prominent hypostyle extending to below the middle of the nutlet.

A shrub, from 2 to 3 metres high, with small erect stems covered with smooth pale bark, spreading branches, and stout zigzag branchlets dark red-brown when they first appear, chestnut-brown, very lustrous and marked by small pale lenticels at the end of their first season and dull gray-brown the following year, and armed with stout chestnut-brown lustrous spines from 2 to 2.5 centimetres long. Flowers in the first week in May. Fruit ripens early in October.

Missouri: low woods near small streams, in gravelly soil, Pleasant Grove, Ripley County, common, *B. F. Bush*, May 7, 1901 (No. 6, type, 6A, 6B, 6C, 6D, 6E, 6F, 6H), *B. F. Bush* and *C. S. Sargent*, October 4, 1912 (No. 6).

CRATÆGUS AMBITIOSA, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of the hairs on the young leaves. Leaves ovate to rhombic, acuminate, rounded or cuneate at the base, finely doubly serrate with straight glandular teeth, and slightly divided into three or four pairs of small acute spreading lateral lobes; when they unfold covered above with soft white caducous hairs, nearly fully grown when the flowers open and then very thin, yellow-green above, pale bluish green below, and at maturity thin, dark blue-green, smooth and lustrous on the upper surface, paler blue-green on the lower surface, from 4 to 5 centimetres long and from 3 to 4 centimetres wide, with slender prominent midribs, and thin primary veins extending to the points of the lobes; petioles slender, slightly wing-margined at the apex, glandular with minute often persistent glands, from 2 to 3.5 centimetres in length. Flowers 2 centimetres in diameter, on short slender pedicels, in small compact mostly from five- to nine-flowered corymbs; calyx-tube narrowly obconic, the lobes abruptly narrowed from broad bases, acuminate, laciniately glandular-serrate usually only above the middle, reflexed after anthesis; stamens twenty; anthers faintly tinged with pink in the bud, soon becoming yellow; styles four or five. Fruit on stout reddish drooping pedicels, in few-fruited clusters, obovate, slightly narrowed and rounded at the apex, abruptly narrowed to the base, crimson, more or less blotched with green, lustrous, marked by large pale dots, from 1.4 to 1.6 centimetres long, and from 1 to 1.2 centimetres in diameter; flesh thin, yellow-green, dry and mealy; nutlets four or five, thin, acute at the ends, irregularly ridged on the back with a low grooved ridge, from 5.5 to 6 millimetres long and from 4 to 4.5 millimetres wide.

An intricately branched shrub, from 4 to 5 metres high, with small stems covered with dark scaly bark, small ascending branches, and very slender nearly straight branchlets, dark orange-green when they first appear, becoming light orange-brown, lustrous and marked by small dark lenticels in their first season and dull grayish brown the following year, and armed with numerous very slender straight or slightly curved chestnut-brown shining spines from 3.5 to 5 centimetres long. Flowers the end of May. Fruit ripens early in October.

Michigan: pastures in low moist ground on Lake Street, south of Read's Lake, east of Grand Rapids, Kent County, *E. J. Cole*, May 15, 1901, May 30 and September 29, 1904 (No. 32, type), October 17, 1904 (No. 158).

CRATÆGUS COMPARATA, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of a few deciduous hairs on the upper surface of the young leaves. Leaves oblong-ovate, acuminate, broad and rounded or gradually narrowed and cuneate at the entire base, sharply doubly serrate above with straight glandular teeth, and slightly divided into four or five pairs of small lateral lobes; nearly one-third grown when the flowers open and then thin and yellow-green, and at maturity thick to subcoriaceous, dark bluish green, smooth and lustrous on the upper surface, pale blue-green on the lower surface, from 6 to 8 centimetres long and from 4.5 to 6 centimetres wide, with thin midribs and primary veins; petioles slender, slightly wing-margined at the apex, rose-colored in the autumn, from 2.5 to 4 centimetres in length; leaves on vigorous shoots ovate, acuminate, rounded at the broad base, more coarsely serrate and more deeply lobed, from 3 to 4 centimetres long and from 2.5 to 3 centimetres wide, with rose-colored midribs and primary veins. Flowers from 2 to 2.2 centimetres in diameter, on long slender pedicels, in narrow lax mostly seven- to ten-flowered corymbs; calyx-tube narrowly obconic, the lobes abruptly narrowed from the base, short, acuminate, glandular-serrate, reflexed after anthesis; stamens twenty; anthers slightly tinged with pink; styles four or five, surrounded at the base by a narrow ring of long pale hairs. Fruit on stout drooping pedicels, obovate to oval, full and rounded at the ends, concave at the insertion of the pedicel, crimson, lustrous, from 1 to 1.2 centimetres long and from 9 to 10 millimetres in diameter; calyx little enlarged, with a wide deep cavity, and small closely appressed lobes dark red on the upper side below the middle; flesh thin, yellow-green, dry and mealy; nutlets four or five, gradually narrowed and rounded at the apex, acute at the base, rounded and grooved or irregularly ridged on the back, from 7 to 7.5 millimetres long and from 4 to 4.5 millimetres wide, the broad hypostyle extending to below the middle of the nutlet.

An arborescent shrub, from 5 to 6 metres high, with stems 4 or 5 centimetres in diameter, covered with dark scaly bark, ascending and spreading branches forming a broad open head, and stout zigzag branchlets dark green tinged with red and marked by pale lenticels when they first appear, light chestnut-brown and lustrous in their first season and dull gray-brown the following year, and armed with stout nearly straight chestnut-brown shining spines from 4 to 6 centimetres long. Flowers the end of May. Fruit ripens late in September or early in October.

Michigan: Lake Street, south of Read's Lake, east of Grand Rapids, Kent County, *E. J. Cole*, May 10 and September 19, 1905 (No. 32–1 type).

CRATÆGUS TUMIDA, *n. sp.* (*Pruinosæ.*)

Glabrous. Leaves oblong-ovate, acuminate, rounded, truncate, or slightly cordate at the base, coarsely doubly serrate with straight spreading teeth, and usually slightly divided above the middle into short broad lobes; nearly fully grown when the flowers open and then thin, light yellow-green, and at maturity thin, yellow-green and lustrous on the upper surface, pale bluish green on the lower surface, from 6 to 8 centimetres long and from 4.5 to 6.5 centimetres wide, with slender midribs, and thin primary veins

extending to the points of the lobes; petioles slender, from 2.5 to 3 centimetres in length; stipules linear to linear-obovate, bright red, glandular, persistent until the flowers open. Flowers 1.8 centimetres in diameter, on slender pedicels, in small five- or six-flowered corymbs; calyx-tube broadly obconic, the lobes separated by wide sinuses, broad, acute, glandular-serrate near the middle, reflexed after anthesis; stamens from fifteen to twenty; anthers dark red; styles from three to five, usually five. Fruit on stout erect pedicels, subglobose, flattened at the ends, sometimes rather broader than high, dull crimson, pruinose, from 1.4 to 1.5 centimetres in diameter; calyx-tube very short, the cavity broad and shallow, wide in the bottom, the lobes little enlarged, appressed, mostly deciduous from the ripe fruit; flesh thin, bright green and mealy; nutlets five, thin and rounded at the ends, prominently ridged on the back with a high rounded ridge, 8 millimetres long and 6 millimetres wide, the prominent hypostyle extending to the base of the nutlet.

A slender shrub, from 4 to 5 metres tall, with stems sometimes 1 decimetre in diameter, and stout nearly straight branchlets dark purple-brown in their first season and dull red-brown the following year, and armed with stout straight or slightly curved chestnut-brown lustrous spines from 3.5 to 4 centimetres in length.

Missouri: Dexter, Stoddard County, *B. F. Bush*, April 23, 1912 (No. 6633, type), October 9, 1912 (No. 6935).

CRATÆGUS REMOTA, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of a few hairs on the upper side of the midribs of the young leaves. Leaves broadly ovate, acuminate, rounded or occasionally abruptly cuneate at the entire base, finely serrate above with straight glandular teeth, and divided above the middle into four or five pairs of short broad spreading lobes; about half-grown when the flowers open and then thin, yellow-green, smooth and lustrous above and pale bluish green below, and at maturity thin, dark blue-green and lustrous on the upper surface, pale bluish green on the lower surface, from 5 to 7 centimetres long and from 4 to 5 centimetres wide, with slender yellow midribs and primary veins; petioles slender, slightly wing-margined at the apex, occasionally glandular while young with minute stipitate glands, from 3 to 3.5 centimetres in length. Flowers 1.5 centimetres in diameter, on short slender pedicels, in small compact mostly seven- or eight-flowered corymbs; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, long, acuminate, laciniately glandular-serrate near the middle, reflexed after anthesis; stamens ten; anthers red; styles four or five, surrounded at the base by a broad ring of pale tomentum. Fruit on short stout erect or spreading pedicels, in few-fruited clusters, slightly obovate, rounded at the ends, scarlet, pruinose, from 1 to 1.5 centimetres long, and from 8 to 10 millimetres in diameter; calyx prominent, without a tube, with a broad deep cavity pointed in the bottom, and erect incurved persistent lobes red on the upper side below the middle; flesh hard, green and dry; nutlets four or five, narrowed and rounded at the apex, acute at the base, ridged on the back with a high narrow ridge, from 8 to 9 millimetres long and from 4 to 4.5 millimetres wide.

An arborescent shrub, from 3 to 5 metres high, with small stems and branches, and slender nearly straight branchlets dark orange-green when they first appear, becoming bright chestnut-brown and lustrous and marked by small pale lenticels in their first season and dark gray-brown the following year, and armed with numerous very slender slightly curved light chestnut-brown shining spines from 4 to 6 centimetres in length. Flowers the middle of May. Fruit ripens the end of September.

Michigan: Robinson Road, west of Read's Lake, east of Grand Rapids, Kent County, *E. J. Cole*, May 21 and September 9, 1902 (No. 86, type), May 18, 1901, September 14, 1902, May 17, 1903 (No. 44).

CRATÆGUS SUPERATA, *n. sp.* (*Pruinosæ.*)

Glabrous. Leaves ovate, acute or acuminate, broad and rounded at the entire base, coarsely doubly serrate above with straight glandular teeth, and slightly divided above the middle into three or four pairs of short broad acuminate lobes; nearly half-grown when the flowers open and then thin, yellow-green and very smooth above, pale or glaucous below, and at maturity thin but firm, dull dark blue-green, smooth and lustrous on the upper surface, pale blue-green on the lower surface, 5 or 6 centimetres long and 4 or 5 centimetres wide, with prominent yellow midribs, and thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly wing-margined at the apex, glabrous, glandular with minute stipitate often persistent glands, from 2.5 to 3 centimetres in length. Flowers from 1.8 to 2 centimetres in diameter, on long slender pedicels, in small compact mostly from five- to seven-flowered corymbs; calyx-tube broadly obconic, the lobes gradually narrowed from wide bases, short, acuminate, entire or occasionally dentate near the middle, reflexed after anthesis; stamens ten; anthers pale pink; styles four or five, surrounded at the base by a broad ring of pale tomentum. Fruit on short stout erect or spreading pedicels, in few-fruited clusters, subglobose, green and lustrous, becoming crimson when fully grown, pruinose, marked by small dark dots, from 1 to 1.2 centimetres in diameter; calyx little enlarged, with a deep narrow cavity, and small erect red lobes; flesh thin, dry and mealy; nutlets four or five, narrowed and rounded at the ends, ridged on the back with a high narrow edge, about 6 millimetres long and 4 millimetres wide, the narrow hypostyle extending for about one-third the length of the nutlet.

A shrub, from 3 to 4 metres high, with numerous stems from 1 to 1.2 decimetres in diameter, covered with dark gray bark, ascending and spreading branches forming a broad open irregular head, and stout nearly straight branchlets dark orange-green when they first appear, becoming dark chestnut-brown, lustrous and marked by pale lenticels in their first season and dull gray-brown the following year, and armed with slender nearly straight dark chestnut-brown shining spines from 2.5 to 3 centimetres long. Flowers the middle of May. Fruit ripens early in October.

Michigan: roadside, five miles south of Grand Rapids, Kent County, *E. J. Cole*, May 23, 1901 (No. 74), May 18, 1903, October 1, 1904 (No. 75), May 23 and September 24, 1905 (No. 169, type).

CRATÆGUS RARA, *n. sp.* (*Pruinosæ.*)

Glabrous with the exception of a few hairs on the young leaves, petioles and branchlets. Leaves ovate, acute or acuminate, gradually or abruptly narrowed and concave-cuneate at the entire base, coarsely often doubly glandular-serrate above, and slightly

divided above the middle into four or five pairs of small acuminate lobes; about half-grown when the flowers open and then thin, smooth, yellow-green with occasional hairs on the midribs above and paler and blue-green below, and at maturity thick and firm, dull dark green, from 4.5 to 5.5 centimetres long and from 4 to 4.5 centimetres wide, with slender midribs, and thin primary veins running obliquely to the lobes of the leaves; petioles slender, narrowly wing-margined at the apex, glandular, hairy on the upper side and glandular while young, soon glabrous, from 1.6 to 2.5 centimetres in length; leaves on vigorous shoots ovate, acute, rounded or abruptly cuneate at the broad base, coarsely serrate, more deeply lobed and sometimes from 5 to 6 centimetres long and from 4.5 to 5 centimetres wide, with stout winged glandular petioles. Flowers from 1.5 to 1.8 centimetres in diameter, on slender pedicels, in small compact mostly six- or seven-flowered corymbs; calyx-tube broadly obconic, the lobes gradually narrowed from a wide base, expanded and deeply laciniately divided near the apex; reflexed after anthesis; stamens ten, rarely fewer; anthers creamy white; styles from three to five, usually four. Fruit on stout erect or spreading pedicels, depressed-globose, umbilicate at the base, dull dark red without bloom, from 1.3 to 1.4 centimetres wide, and from 1.1 to 1.2 centimetres high; calyx prominent, with a short tube, a broad deep cavity wide in the bottom, and reflexed and appressed lobes dark red on the upper side below the middle and persistent on the ripe fruit; flesh greenish or yellowish white, hard, dry and insipid; nutlets usually four, rounded at the ends, broader at the apex than at the base, rounded and slightly ridged on the back, from 6 to 7 millimetres long and from 4 to 4.5 millimetres wide, the narrow hypostyle extending nearly to the middle of the nutlet.

A shrub, from 2 to 3 metres high, with long straggling branches, and slender nearly straight branchlets light orange green marked by pale lenticels and slightly villose when they first appear, light chestnut-brown and lustrous at the end of their first season and ultimately dull gray-brown, and armed with numerous slender straight chestnut-brown spines from 3.5 to 4.5 centimetres in length. Flowers the end of May. Fruit ripens early in October.

Connecticut: thickets, Griswold, New London County, *C. B. Graves*, May 26 and October 19, 1903, September 19, 1905.

This interesting plant belongs to the small group of the Pruinosæ with yellow anthers and only ten stamens. Four species only of this section of the group have previously been recognized. This addition to it most closely resembles *C. delawarensis*, Sargent, from which it differs in its less deeply lobed leaves broader at the base, and in the foliaceous tips of the calyx-lobes; it differs, too, in the fruit; that of *C. delawarensis* is not umbilicate at the base; the calyx is little enlarged, with a narrow cavity pointed in the bottom; the nutlets are more prominently ridged and the hypostyle is wider and more conspicuous.

CRATÆGUS MACKENSENII, *n. sp.* (*Molles.*)

Leaves ovate, acute, gradually or abruptly narrowed and concave-cuneate at the base, coarsely often doubly serrate with straight glandular teeth, and slightly divided above the middle into short broad lobes pointing toward the apex of the leaf; when they unfold tinged with red and covered above by short white hairs and thickly covered below with snowy white tomentum; more than half-grown when the flowers open and then light yellow-green and roughened on the upper surface by short white hairs and hoary-tomentose on the lower surface, and at maturity thin but firm in texture, dark green, very lustrous and scabrate above, still tomentose below, from 6 to 7.5 centimetres long and from 5 to 6 centimetres wide, with broad midribs, and prominent primary veins; petioles slender, densely villose with persistent white hairs, from 1.3 to 2.5 centimetres in length; leaves on vigorous shoots ovate, acute or acuminate, abruptly cuneate or rounded at the base, more coarsely serrate and more deeply lobed, and often 1 decimetre long and broad, their stipules foliaceous, broadly ovate, more or less falcate, coarsely serrate, sometimes persistent during the season. Flowers from 2.2 to 2.4 centimetres in diameter, on long slender hairy pedicels, in broad many-flowered corymbs, their bracts and bractlets oblong-obovate, scarious, glandular, persistent until after the petals fall; calyx-tube narrowly obconic, thickly covered with matted white hairs, the lobes gradually narrowed from wide bases, long, acuminate, laciniately glandular-serrate, slightly villose on the outer surface, densely villose on the inner surface, reflexed after anthesis; stamens twenty; anthers yellow; styles from three to five. Fruit on stout villose pedicels, subglobose, flattened at the ends, bright red marked by occasional pale dots, slightly pubescent at the ends, from 1.2 to 1.5 centimetres in diameter; calyx prominent, with a wide deep cavity broad in the bottom, and spreading often erect lobes dark red and slightly hairy on the upper surface; flesh orange-colored, soft and edible; nutlets from three to five, thin and rounded at the ends, broader at the apex than at the base, ridged on the back with a narrow grooved ridge, from 5.5 to 6 millimetres long and 4 millimetres wide, the broad conspicuous nearly black hypostyle extending to below the middle of the nutlet.

A tree, occasionally 10 metres high, with a tall trunk 2.5 decimetres in diameter with dark red-brown bark covered with small closely appressed only slightly attached scales, thick erect and spreading branches forming an open head, and stout nearly straight branchlets red-brown and covered with matted pale hairs when they first appear, becoming bright chestnut-brown and lustrous at the end of their first season and dull gray-brown the following year, and unarmed or armed with occasional slender straight dark chestnut-brown shining spines from 3 to 5 centimetres in length. Flowers at the end of March. Fruit ripens in September.

Texas: rich woods along the San Antonio River, at San Antonio, Bixar County, *C. S. Sargent*, March 26, 1881, March 27, 1885, March 16 and 23, 1900, March 29, 1913, *B. F. Bush*, October 3, 1900 (No. 1245), September 16, 1901 (Nos. 793 and 801), September 18, 1901 (No. 1829), March 22, 1902 (No. 1163, type), *B. Mackensen*, March 26, 1910, September, 1912; banks of the Cibelo River, Sutherland Springs, Wilson County, *B. Mackensen*, March 27, 1910, *C. S. Sargent*, March 30, 1913; banks of the Guadaloupe River, Victoria, Victoria County, *C. Mohr* (No. 34, no date). ?Mexico: Saltillo, Nuevo Leon, *C. S. Sargent*, April 5, 1887.

This handsome tree has usually been confounded with *Cratægus texana* Buckley, of eastern Texas. From that tree, however it differs in its yellow, not dark red, anthers, smaller calyx-lobes and smoother leaves, in the shape of the fruit and in the smaller nutlets with a more prominent and darker-colored hypostyle. I take much pleasure in associating this species, which is the only Cratægus which has been found in the neighborhood of San Antonio, with the name of Mr. Bernard Mackensen of that city, the author of *The Trees and Shrubs of San Antonio and its Vicinity.*

CRATÆGUS PLACENS, *n. sp.* (*Molles.*)

Leaves ovate, acute, cordate or abruptly cuneate at the broad base, coarsely often doubly serrate with straight teeth, and slightly divided into five or six pairs of short broad lateral lobes; about one-third grown when the flowers open and then thin, light yellow-green and roughened above by short white hairs and covered below with matted hairs most abundant on the midribs and veins, and at maturity thin, yellow-green and scabrate or nearly smooth on the upper surface, on the lower surface paler and densely villose on the stout midribs and prominent primary veins extending to the points of the lobes, from 8 to 10 centimetres long and from 7 to 8 centimetres wide; petioles slender, densely villose early in the season, becoming pubescent, occasionally glandular with bright red stipitate glands, from 3 to 5.5 centimetres in length; stipules obovate, acuminate, often falcate, glandular-serrate, villose, usually persistent until the flowers open; leaves on vigorous shoots oblong-ovate or broadly ovate, gradually narrowed and rounded at the base, more coarsely serrate and more deeply lobed, often from 1.1 to 1.2 decimetres long and from 8 to 9 centimetres wide. Flowers from 1.8 to 2 centimetres in diameter, on slender hairy pedicels, in wide lax mostly from fifteen- to twenty-flowered hairy corymbs, their bracts and bractlets oblong-obovate, glandular, conspicuous, persistent until after the petals fall; calyx-tube narrowly obconic, thickly covered with matted pale hairs, the lobes slender, acuminate, glandular-serrate, slightly villose, reflexed after anthesis; stamens twenty; anthers dark rose-colored; styles five. Fruit on slender drooping hairy pedicels, obovate, rounded at the apex, abruptly narrowed at the base, scarlet, covered with pale hairs and densely villose at the base, from 1.2 to 1.4 centimetres long and 1 centimetre in diameter; calyx prominent, with a broad deep cavity wide in the bottom, and spreading appressed or erect lobes villose on the upper surface; flesh thick, sweet and edible; nutlets five, acute at the ends, rounded and slightly ridged on the back, 5 or 6 millimetres long and 3 millimetres wide, the broad conspicuous hypostyle extending nearly to the base of the nutlet.

A tree, sometimes 10 metres high, with a trunk 1 metre in diameter, covered with dark rough bark, large spreading branches forming a broad head from 8 to 10 metres across, and rather slender nearly straight branchlets light orange-brown marked by pale lenticels and slightly hairy when they first appear, bright chestnut-brown, lustrous and nearly glabrous at the end of their first season and dull gray-brown the following year, and unarmed, spines occasionally occurring on the trunk and large branches. Flowers about the 20th of May. Fruit ripens early in September.

Ontario: Walpole Island in the St. Clair River, Lamberton County, *C. K. Dodge*, July 12, 1906 (No. 136), May 4 and August 30, 1908 (type), September 8, 1912. Michigan: near Algonac, St. Clair County, *C. K. Dodge*, September 16, 1905, May 16, 19—; bottoms of Plaster Creek, south of Grand Rapids, Kent County, *E. J. Cole*, May 14, 1903, September 4, 1904 (No. 148, a shrub, 3 or 4 metres high; anthers fifteen to twenty; branchlets furnished with stout recurved spines).

CRATÆGUS METICULOSA, *n. sp.* (*Intricatæ.*)

Glabrous with the exception of a few hairs on the upper surface of the young leaves. Leaves ovate to rhombic, acuminate, gradually narrowed to the slender concave-cuneate base, finely often doubly serrate with straight glandular teeth, and generally slightly divided above the middle into two or three pairs of broad acute lobes; nearly fully grown when the flowers open and then thin, yellow-green and slightly hairy above and paler below, and at maturity thin but firm, dark yellow-green, smooth, lustrous and glabrous on the upper surface, pale yellow-green on the lower surface, from 3.5 to 4.5 centimetres long and from 3 to 4 centimetres wide, with thin yellow midribs and primary veins; petioles slender, wing-margined to below the middle, glandular with minute often persistent glands, frequently rose-colored toward the base in the autumn, from 1 to 1.5 centimetres in length. Flowers from 1.4 to 1.5 centimetres in diameter, on long slender pedicels, in compact mostly five- or six-flowered corymbs, with small obovate to linear glandular bracts and bractlets fading brown and often deciduous before the flowers open; calyx-tube narrowly obconic, the lobes gradually narrowed from the base, broad, acuminate, glandular-serrate above the middle, reflexed after anthesis; stamens ten; anthers pale pink; styles two or three. Fruit on long stout red erect or spreading pedicels, in few-fruited clusters, short-oblong to ovate, full and rounded at the ends, dark green when fully grown, turning (often after falling to the ground) orange-red, lustrous, marked by small dark dots, from 1.2 to 1.4 centimetres long and from 1 to 1.2 centimetres in diameter; calyx prominent, with a short tube, a narrow deep cavity and small spreading or reflexed often persistent lobes dark red on the upper side; flesh thin, yellow-green, dry and mealy; nutlets two or three, narrowed and rounded at the ends, broader at the base than at the apex, ridged on the back with a narrow ridge, from 7 to 8 millimetres long and from 3 to 4 millimetres wide, the narrow hypostyle extending nearly to the middle of the nutlet.

A shrub, from 1 to 2 metres high, with contorted branchlets, light orange-green tinged with red when they first appear, becoming dark chestnut-brown, lustrous and marked by large dark lenticels in their first season and dull red-brown the following year, and armed with slender straight purplish shining spines from 3 to 4 centimetres long. Flowers the end of May. Fruit ripens early in October.

Michigan: sandy bluffs on the Grand Trunk Railroad, west of Fuller Station, near Grand Rapids, Kent County, *E. J. Cole*, May 29 and September 28, 1901 (No. 110, type), May 27, 1901, September 10, 1902 (No. 25), May 29, 1901, September 10, 1912, September 25, 1904 (No. 66), May 29 and September 29, 1904 (No. 106).

CRATÆGUS TENUISSIMA, *n. sp.* (*Intricatæ.*)

Glabrous with the exception of the hairs on the young leaves. Leaves oblong-ovate to elliptical, acute at the apex, cuneate at the base, finely often doubly serrate with straight glandular teeth, and divided usually only above the middle into four or five pairs of short broad acute lobes; more than half-grown when the flowers open and then thin, yellow-green, and slightly hairy on the midribs above and pale and glabrous below, and at maturity thin, yellow-green, from 5 to 6 centimetres long and from 3 to 4 centimetres wide, with pale prominent midribs and thin primary veins; petioles slender, wing-margined at the apex, glandular, from 1.5 to 3 centimetres in length. Flowers from 1.8 to 2 centimetres in diameter, on short slender pedicels, in small compact mostly four- or five-flowered corymbs, their bracts and bractlets obovate, conspicuously glandular, persistent until the petals fall;

calyx-tube narrowly obconic, the lobes slender, dilated, laciniately glandular-serrate and acuminate at the apex, reflexed after anthesis ; stamens from seven to ten ; anthers cream color ; styles from two to four. Fruit obovate, rounded at the apex, abruptly narrowed at the base, dull red, from 1.2 to 1.4 centimetres long and from 8 to 10 millimetres in diameter ; calyx prominent with a wide shallow cavity pointed in the bottom, and reflexed appressed persistent lobes red on the upper side ; flesh thin, dry and hard ; nutlets usually three or four, rounded at the ends, rather broader at the apex than at the base, rounded and ridged on the back, from 7 to 8 millimetres long and 4 millimetres wide, the narrow hypostyle extending only to the middle of the nutlet.

A shrub, about 1 metre high, with slender nearly straight branchlets, dull red-brown and marked by pale lenticels when they first appear, becoming dark purple at the end of their first season, and armed with numerous very slender straight spines from 2 to 3 centimetres in length. Flowers the end of May. Fruit ripens early in October.

Pennsylvania : Lincoln Heights, Scranton, Lackawanna County, *A. Twining*, September 25, 1907, May 25, 1912 (No. 64, type).

CRATÆGUS STELLATA, *n. sp.* (*Intricatæ.*)

Glabrous with the exception of the hairs on the upper surface of the young leaves. Leaves oblong-ovate, acuminate, abruptly or gradually narrowed and concave-cuneate at the base, finely often doubly serrate with straight glandular teeth, and divided into four or five pairs of acuminate spreading lateral lobes ; about half-grown when the flowers open and then thin, yellow-green and slightly hairy above and glabrous below, and at maturity thick, yellow-green, and lustrous on the upper surface, paler on the lower surface, from 3.5 to 4 centimetres long and about 2.5 centimetres wide, with slender midribs and thin primary veins extending obliquely to the points of the lobes ; petioles slender, slightly wing-margined at the apex, from 1.5 to 2.5 centimetres in length ; leaves on vigorous shoots broadly ovate, acute, abruptly cuneate at the wide base, thicker, more coarsely serrate, more deeply lobed, from 5 to 6 centimetres long and from 5 to 5.5 centimetres wide, with stout wing-margined glandular petioles. Flowers cup-shaped, from 1.6 to 1.8 centimetres in diameter, on short slender pedicels, in compact from three- to five-flowered corymbs; calyx-tube broadly obconic, the lobes separated by wide sinuses, slender, acuminate, entire or minutely glandular-dentate near the middle ; stamens ten ; anthers creamy white ; styles from three to five. Fruit on slender erect pedicels, oval or subglobose, dull reddish green, from 1.1 to 1.3 centimetres in diameter ; calyx prominent, with a long tube, a wide deep cavity pointed in the bottom, and reflexed and appressed lobes ; flesh thin, hard and dry; nutlets from three to five, thin and rounded at the ends, broader at the apex than at the base, rounded and slightly grooved on the back, from 5.5 to 6 millimetres long and 3.5 millimetres wide, the small hypostyle extending rather less than half the length of the nutlet.

A shrub, from 2 to 2.5 metres high, with erect branches forming a compact head and slender only slightly zigzag branchlets light orange-brown and marked by pale lenticels when they first appear, becoming light chestnut-brown and very lustrous in their first season, and armed with stout straight spines from 2 to 3 centimetres in length. Flowers the first week of June. Fruit ripens the end of September.

Connecticut : rocky pastures, near the Miantic River, East Lyme, New London County, *C. B. Graves*, September 26, 1903, June 7, 1905 (No. 54A, type).

CRATÆGUS SHIRLEYENSIS, *n. sp.* (*Anomalæ.*)

Leaves ovate to oval or obovate, acuminate, cuneate or rounded at the entire base, sharply often doubly serrate with straight glandular teeth, and slightly divided above the middle into small acuminate lobes pointing forward ; when they unfold slightly tinged with red and covered above by soft white hairs and glabrous below, nearly half-grown when the flowers open and then still hairy above, and at maturity thin, blue-green and smooth or scabrate on the upper surface, paler on the lower surface, from 4.5 to 5 centimetres long and from 2.5 to 4 centimetres wide, with slender midribs, and thin primary veins extending obliquely to the points of the lobes ; petioles slender, slightly wing-margined at the apex, pubescent on the upper side early in the season, soon glabrous, glandular with occasional deciduous glands, from 1.6 to 2 centimetres in length ; leaves on vigorous shoots abruptly pointed at the apex, gradually narrowed and rounded at the base, more deeply lobed and often from 5.5 to 6 centimetres long and 4 centimetres wide. Flowers 1.5 centimetres in diameter, on slender pedicels densely covered with long white matted hairs, in small lax from five- to eleven-flowered hairy corymbs ; calyx-tube narrowly obconic, densely villose, the lobes gradually narrowed from broad bases, acuminate, coarsely glandular serrate near the middle, glabrous on the outer surface, villose on the inner surface, reflexed after anthesis ; stamens twenty; anthers pink ; styles three or four, surrounded at the base by a narrow ring of pale tomentum. Fruit on long slender slightly villose pedicels in drooping clusters, subglobose to short-oblong, orange-red, about 1 centimetre in diameter; calyx little enlarged, with a wide shallow cavity broad in the bottom, and closely appressed lobes often deciduous from the ripe fruit ; flesh thin, dry and mealy; nutlets three or four, gradually narrowed and rounded at the ends, broader at the apex than at the base, only slightly ridged on the back, from 5 to 6 millimetres long and 3 millimetres wide, with obscure ventral depressions, the broad prominent hypostyle extending to below the middle of the nutlet.

A shrub, from 2 to 3 metres high, with stout slightly zigzag glabrous branchlets light orange-brown when they first appear, light chestnut-brown and lustrous at the end of their first season and dull gray-brown the following year, and armed with numerous stout straight lustrous ultimately gray spines, from 2.5 to 3.5 centimetres in length. Flowers the end of May. Fruit ripens from the middle to the end of September.

Massachusetts : roadsides, Shirley, Middlesex County, *Evelyn F. Thayer*, May 22, 1904, May 18 and 20, and September 17, 1906 (No. 3, type).

This plant is entirely unlike any of the other species of eastern New England, and I refer it with considerable doubt to the Anomalæ Group on account of the shape of the leaves on vigorous shoots, which resemble those of the other plants of this group, rather than on account of the slight depressions sometimes found on the ventral faces of the nutlets, as these are often entirely wanting.

CRATÆGUS BROCKWAYÆ, *n. sp.* (*Anomalæ.*)

Cratægus Douglasii, C. F. Wheeler, *Rep. Mich. State Board Agric.* 1898, 84. — Sargent, *Man.* 502. — Eggleston, Gray, *Man.* ed. 7, 479. — Britton & Shafer, *North Am. Trees*, 480 (all in so far as relates to Michigan and Ontario) (not Lindley).

Cratægus brevispina, Britton, *Man.* 519 (not Douglas) (1901).

Leaves obovate, acute or acuminate, gradually narrowed, cuneate and entire at the base, coarsely and often doubly serrate above and sharply divided above the middle into numerous short acuminate lobes; nearly fully grown when the flowers open and then slightly hairy above and sparingly villose along the midribs and veins below, and at maturity thin, dark green, lustrous and scabrate on the upper surface, glabrous or still slightly villose on the lower surface, from 4.5 to 5 centimetres long and from 3 to 4 centimetres wide, with prominent midribs, and thin primary veins extending obliquely to the points of the lobes; petioles slender, slightly villose on the upper surface while young, soon glabrous, glandular with deciduous glands, from 1 to 1.5 centimetres in length; leaves on vigorous shoots broadly ovate, acuminate, gradually narrowed at the base, coarsely serrate, more deeply lobed, from 7 to 8 centimetres long and from 6 to 7 centimetres wide. Flowers from 1.2 to 1.5 centimetres in diameter, on long slender pedicels, in small mostly from five- to seven-flowered corymbs; calyx-tube broadly obconic, the lobes gradually narrowed from the base, short, broad, acuminate, ciliate on the margins and coarsely glandular-serrate near the apex, tinged with red and glabrous on the outer surface, densely villose on the inner surface, reflexed after anthesis; stamens from five to ten; anthers yellow tinged with pink at the apex; styles three or four. Fruit on slender drooping red pedicels, short-oblong to slightly obovate, dark vinous purple with a blue bloom, from 1.2 to 1.4 centimetres long; calyx little enlarged with a narrow deep cavity wide and tomentose in the bottom, and erect and incurved or spreading lobes; flesh thick, yellow, soft and sweet; nutlets three or four, rounded at the ends, rather broader at the apex than at the base, rounded and slightly ridged on the back, occasionally marked by obscure ventral depressions, the dark narrow hypostyle extending to below the middle of the nutlet.

A shrub, sometimes 7 or 8 metres high, with several erect and spreading stems often from 1.2 to 1.4 decimetres in diameter, covered with dark brown or nearly black bark separating into thick platelike scales, spreading branches forming a round-topped head sometimes 10 metres across, and slender nearly straight glabrous branchlets light orange-brown and marked by pale lenticels when they first appear, becoming bright chestnut-brown and very lustrous in their first season and dark brownish purple the following year, and armed with numerous stout nearly straight chestnut-brown ultimately gray spines from 2.5 to 3 centimetres in length and long persistent on the large branches and stems; or occasionally treelike with a single trunk usually divided near the ground, but occasionally several feet in height and with wide-spreading branches. Flowers the end of June. Fruit ripens the end of August or early in September.

Michigan: hillsides, near Clifton, Keweenaw County, very common, *O. A. Farwell*, June 30, 1884, August 30, 1894, August, 1899 (No. 116), June and August 28, 1898 (type); Thunder Bay Island, Alpina County, *C. F. Wheeler*, July 18, 1895; Mackinac Island, Mackinac County, *C. S. Sargent*, August 22, 1911. Ontario: Michipicoten Island in Lake Superior (*J. Macoun*).

This species has usually been referred to *C. Douglasii*, Lindley, of the northern Rocky Mountains and the northwest coast region. From that species it differs in the color of the fruit and in the only occasional slight depressions on the inner faces of the nutlets which are often entirely wanting, and in its entirely different habit. The relationship of this plant is not clear, and for the present, at least, it seems best to place it in the Anomalæ, in spite of the color of the fruit, rather than with the Douglasiæ, which are exclusively western and in which the ventral cavities of the nut are more common and more developed.

At the request of Mr. Farwell, who has seen more of this plant than any one and has pointed out its characters and described its habit, it is named for his mother, Charlotte Louise Brockway.

CRATÆGUS SCABERA, *n. sp.* (*Tomentosæ.*)

Leaves broadly ovate, acute or acuminate, abruptly or gradually narrowed and concave-cuneate at the entire base, coarsely often doubly serrate with apiculate glandular teeth, and slightly divided above the middle into four or five pairs of small acuminate lobes; more than half-grown when the flowers open and then dark yellow-green and roughened above by short hairs, and villose along the midribs and veins with snow-white hairs, and at maturity thin, yellow-green and scabrate on the upper surface, paler and still villose on the lower surface and on the slender midribs and thin primary veins, from 4 to 6 centimetres long and from 3.5 to 4 centimetres wide; petioles stout, narrowly wing-margined nearly to the base, densely villose, from 1 to 1.5 centimetres in length; leaves on vigorous shoots oblong-ovate, acute, concave-cuneate or rarely rounded at the base, often from 7 to 8 centimetres long, and from 6 to 6.5 centimetres wide. Flowers 1.2 centimetres in diameter, on long slender villose pedicels, in mostly from eight- to ten-flowered hairy corymbs; calyx-tube narrowly obconic, densely villose, the lobes narrow, glandular-serrate, slightly villose, reflexed after anthesis; stamens twenty; anthers small, rose-colored; styles two or three, surrounded at the base by a narrow ring of white hairs. Fruit on slender drooping villose pedicels, subglobose to slightly ovoid, bright cherry-red, lustrous, marked by occasional large dark dots, slightly hairy especially near the base, 1 centimetre in diameter; calyx prominent, with a broad deep cavity pointed in the bottom, and appressed lobes hairy on the upper side and generally deciduous from the ripe fruit; flesh thin, orange-colored, sweet and mealy; nutlets two or three, narrowed and rounded at the ends, broader at the apex than at the base, slightly ridged on the back, from 6 to 7 millimetres long and from 4 to 5 millimetres wide, the narrow hypostyle extending to below the middle of the nutlet.

A slender arborescent shrub, from 5 to 7 metres high, with small stems, smooth pale bark, near the ground covered with small appressed scales, and slender nearly straight branchlets light reddish brown and covered when they first appear with floccose hairs, pubescent or nearly glabrous at the end of their first season and dull pale gray-brown the following year, and armed with numerous straight chestnut-brown shining spines from 3 to 4.5 centimetres in length. Flowers late in May. Fruit ripens early in October.

Missouri: low woods, along the bottoms of small streams, in gravelly soil, near Pleasant Grove, Ripley County, *B. F. Bush*, May 20, 1900 (No. 346, type), *C. S. Sargent*, September 30, 1900, *B. F. Bush* and *C. S. Sargent* (No. 6873A). C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXCI. CRATÆGUS PEREGRINA.

1. A flowering branch, natural size.
2. A flower-bud, enlarged.
3. Vertical section of a flower, enlarged.
4. A calyx-lobe, enlarged.
5. A fruiting branch, natural size.
6. Cross section of a fruit, enlarged.
7. A nutlet, side view, enlarged.
8. A nutlet, dorsal view, enlarged.

C. E. Faxon del.

CRATÆGUS PEREGRINA, Sarg.

PRUNUS PALMERI, SARG.

PRUNUS (PRUNOPHORA) PALMERI, *n. sp.*

Leaves ovate to oblong-obovate, abruptly acuminate and long-pointed at the apex, narrowed and cuneate or rounded at the base, and coarsely often doubly serrate with acuminate glandular teeth; when they unfold covered above by short caducous hairs and below by long white spreading hairs developed only from the midribs, veins and veinlets, and at maturity thin, light yellow-green and glabrous on the upper surface, paler and sparingly villose on the lower surface along the slender midribs and primary veins, from 6 to 7.5 centimetres long and from 3 to 4 centimetres wide; petioles slender, pubescent, usually eglandular or furnished with an occasional oblong gland, from 1.2 to 1.5 centimetres in length; stipules linear, acuminate, occasionally three-lobed, villose, sparingly glandular. Flowers about 1.8 centimetres in diameter, on slender glabrous pedicels from 1 to 1.2 centimetres in length, in from two- to five-flowered umbels; calyx-tube narrowly obconic, puberulous, the lobes long, acuminate, entire, ciliate on the margins, puberulous and more or less tinged with red on the outer surface, covered on the inner surface with matted pale hairs; petals oblong-obovate, narrowed and rounded at the apex, gradually narrowed below into a long claw, usually crenulate toward the apex; stamens about twenty-five; anthers yellow; style elongated, exceeding the stamens. Fruit on drooping glabrous pedicels, oval, deep pink to crimson, covered with a glaucous bloom, often 2.5 centimetres long and 2 centimetres in diameter, with thick flesh of good quality; stone oblong, compressed, rounded at the base, pointed and apiculate at the apex, ridged on the dorsal edge with a thin narrow ridge, thin and slightly grooved on the ventral edge.

A tree, sometimes 7 or 8 metres high, with a tall trunk often 1.5 metres in diameter, covered with pale gray-brown bark exfoliating in large thin scales, small erect branches, and slender unarmed branchlets light yellow-green and puberulous when they first appear, soon glabrous, light orange-brown during their first season, and dark red-brown the following year. Winter-buds acute, from 3 to 4 millimetres long, with light chestnut-brown puberulous scales ciliate on the margins. The flowers appear from the 10th to the middle of April with the unfolding leaves. Fruit ripens the middle of August.

Missouri: rich rocky hillsides in limestone soil, near Carterville, Jasper County, *E. J. Palmer*, April 11 and June 15, 1909, April 14, 1910 (No. 6, type), *P. L. Ricker*, April 16, 1910 (No. 3397); Smithfield, Jasper County, in rich alluvial soil, *E. J. Palmer*, June 13, 1909, April 23 and 24, 1911 (No. 13, shrub-like in habit and with smaller subglobose fruit).

This species does not produce the suckers which are always developed by *Prunus americana* Marshall. From *Prunus arkansana* Sargent it differs in the shape of its thinner leaves, in their pale, not rusty hairs, its puberulous calyx and narrow petals, smaller fruit, and in the less developed dorsal ridge of the stone. From *Prunus polyandra* Sargent it differs in the shape of the more compressed stone, that of *Prunus polyandra* being obovate, abruptly pointed at the apex, acute at the base, and prominently ridged on the dorsal edge. From *Prunus reticulata* Sargent it differs in the shape of its much thinner leaves, inconspicuous veinlets, larger flowers, larger and early-ripening fruit, and compressed stones. From these species it differs, too, in its pale scaly not dark brown deeply furrowed bark. From *Prunus tenuifolia*, which also has pale bark, it differs in its larger flowers without the long hairs at the base of the calyx, in the shape and pubescence of the leaves and in the shape of the stones.[1]

[1] Mr. E. J. Palmer has found in the neighborhood of Webb City, Jasper County, Missouri, a form of *Prunus hortulana* Bailey with leaves covered on the upper surface with short white hairs and villose on the lower surface especially on the midribs

and veins; the petioles and branchlets of the year are densely pubescent, otherwise as in the type. This form may be distinguished as—

PRUNUS HORTULANA, *var.* PUBENS, *n. var.*

Webb City, Jasper County, *E. J. Palmer*, April 17 and July 31, 1910, April 2, 1911 (No. 19, type), March 27, April 17 and June 7, 1910 (No. 12).

Another species of Prunus may be described as—

PRUNUS (PRUNOPHORA) FULTONENSIS, *n. sp.*

Leaves ovate to oval or rarely slightly obovate, acuminate, rounded and often unsymmetrical at the base, coarsely often doubly serrate with straight apiculate teeth, thin dark green and sparingly pubescent above, paler and villose-pubescent below especially on the slender midribs and primary veins, from 8 to 11 centimetres long and from 3.5 to 5.5 centimetres wide; petioles slender, pubescent, eglandular, or glandular near the apex. Flowers from 1.5 to 1.7 centimetres in diameter, on slender pedicels slightly hairy toward the apex, and from 1.2 to 1.5 centimetres in length, in mostly three- or four-flowered umbels; calyx-tube narrowly obconic, puberulous, the lobes narrowed and rounded at the apex, and coated with pale hairs more thickly on the inner than on the outer surface, reflexed after anthesis; petals obovate, rounded and often crenulate at the apex, abruptly narrowed below into short claws; stamens from twenty to twenty-five, about as long as the style; anthers yellow. Fruit on stout nearly glabrous pedicels, globose, dark bluish purple, from 1.5 to 1.7 centimetres in diameter, with a thick skin and thin flesh; stone much compressed, rounded at the base, acute at the apex, unsymmetrical on the two sides, rounded and obscurely ridged on the dorsal edge, straighter and only slightly grooved on the ventral edge, 9 or 10 millimetres long and broad.

A tree, 7 or 8 metres high, with a trunk covered with dark deeply furrowed scaly bark, small branches and slender chestnut-brown glabrous branchlets marked by numerous pale lenticels, becoming dark gray-brown in their second year. Flowers appear before the leaves about the 20th of March. Fruit ripens in June.

Arkansas: woods near Fulton, Hempstead County, *I. H. Kellogg*, March 22, June 22 and August 29, 1910 (No. 240, type).

This tree, like the other species in this group, does not produce suckers, but differs from them in its thin leaves, in the bluish purple, not red, much smaller fruits, and in the shape of the small much compressed stones. C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXCII. PRUNUS PALMERI.

1. A flowering branch, natural size.
2. Vertical section of a flower deprived of its petals, enlarged.
3. A calyx-lobe, enlarged.
4. A petal, enlarged.
5. A fruiting branch, natural size.
6. A stone, natural size.
7. A stone, dorsal edge, natural size

C. E. Faxon del.

PRUNUS PALMERI, Sarg.

PROSOPIS JULIFLORA, VAR. CONSTRICTA, SARG.

PROSOPIS JULIFLORA, var. CONSTRICTA, *n. var.*

PROSOPIS GLANDULOSA, Cox, *Bull.* No. 1, *La. State Mus.*, 2, f (not Torrey) (1910).

Leaves two- or rarely four-pinnate, the pinnæ mostly from twenty- to twenty-four-foliolate; leaflets oblong to oblong-ovate, often falcate, dark green, acute or rounded and apiculate at the apex, from 2 to 4 centimetres long and from 5 to rarely 10 millimetres wide. Flowers on slender pedicels from 2 to 3 millimetres in length, in spikes from 8 to 10 centimetres long; calyx glabrous, five-lobed, the lobes acuminate; petals five, acuminate at the ends, free at the base, pale yellow, glabrous on the outer surface, coated above the middle on the inner surface with long white hairs, about 4 millimetres long; stamens ten, free, inserted with the petals on the margin of a minute disk adnate to the calyx-tube, those opposite the lobes of the calyx rather longer than the others; filaments filiform, exserted; anthers oblong, versatile, their connectives tipped with a minute deciduous gland; ovary stipitate, densely coated with long matted white hairs, gradually narrowed into a filiform style, ending in a minute terminal stigma; legumes from 5 to 14 centimetres long, on stout pedicels from 1.5 to 8 millimetres in length, nearly straight, slightly compressed to subterete, terminating in long points usually much constricted between the from three to twelve seeds, pale yellow more or less streaked with brown; seeds compressed, oblong, unsymmetrical, gradually narrowed and acute at the apex, rounded at the base, light yellow-brown, about 10 metres long and from 7 to 8 millimetres wide, enclosed in the thick sweet pulpy inner coat of the pod.

A shrub, 3 or 4 metres high, with numerous stout spreading stems and red-brown branches armed with slender straight pale gray spines from 1 to 3 centimetres long.

Louisiana: hillsides near Shreveport, Caddo Parish, *R. S. Cocks*, August, 1907, *R. S. Cocks* and *C. S. Sargent*, March 27, 1908, *T. D. Coty, Jr.*, July 30, 1908.

From the other species and varieties of Prosopis this variety differs in the conspicuous constriction between the seeds of most of the pods, although occasionally pods occur in which this constriction is only slightly developed. From *Prosopis juliflora*, var. *glandulosa*, Sargent, a form of eastern Texas, it differs also in its more crowded and wider leaflets.

Prosopis is usually an inhabitant of dry and semi-arid regions, and it is remarkable to find a representative of the genus in the fertile Red River valley of western Louisiana, although Prosopis occurs occasionally in the moist valley of the lower Brazos River near the coast of Texas. C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXCIII. PROSOPIS JULIFLORA, var. CONSTRICTA.

1. A flowering branch, natural size.
2. A flower, enlarged.
3. Vertical section of a flower, enlarged.
4. A petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. Vertical section of a portion of a fruit, natural size.
9. A seed, enlarged.

C. E. Faxon del.

PROSOPIS JULIFLORA, var. CONSTRICTA, Sarg.

ERYTHRINA, L.

(Leguminosæ.)

ERYTHRINA, Linnæus, *Gen.* 216 (1737). — A. L. de Jussieu, *Gen.* 356. — Meissner, *Gen.* 93. — Endlicher, *Gen.* 1295. — Bentham & Hooker, *Gen.* i. 531. — Baillon, *Hist. Pl.* ii. 246. — Engler & Prantl, *Pflanzenfam.* iii. pt. 3, 363.

XYPHANTHUS, Rafinesque, *Fl. Ludovic.* 103 (1817).

CHIROCALYX, Meissner, Hooker, *London Jour. Bot.* ii. 97 (1843). — Walpers, *Rep.* v. 535; *Ann.* i. 251.

MICROPTERYX, Walpers, *Linnæa*, xxiii. 739 (1850); *Ann.* ii. 425.

DUCHASSAINGIA, Walpers, *Linnæa*, xxiii. 741 (1850); *Ann.* ii. 424.

STENOTROPIS, Hasskarl, *Retzia*, i. 183 (1855). — Walpers, *Ann.* iv. 558.

HYPAPHORUS, Hasskarl, *Hort. Bogor.* 197 (1858).

Trees or shrubs with erect terete stems and branches often armed with recurved prickles, or rarely herbaceous. Leaves alternate, pinnately three-foliate, stipules small, the stipels glandlike. Flowers papilionaceous, showy, in pairs or fascicled on the rachis of axillary leafless racemes, or in terminal racemes furnished at the base with leaflike bracts; calyx oblique, truncate, or five-dentate; corolla usually scarlet; petals free, standard broad or elongated, erect or spreading, nearly sessile or raised on a long claw; wing-petals small or wanting, longer or shorter than the keel-petals; stamens ten, united into a tube split on the upper side, the tenth and upper stamen separate or all ten united; anthers uniform; ovary stipitate, one-celled; style subulate incurved, naked; stigmas small, terminal; ovules numerous, amphitropous, the micropyle superior. Fruit a stipitate linear-falcate pod narrowed at the ends, compressed or subterete, constricted or undulate between the seeds, two-valved; seeds reniform, attached by an oblong basal hilum, exalbuminous.

From twenty-five to thirty species of Erythrina are recognized, all inhabitants of tropical and semitropical regions. In the gardens of warm countries several of the species are cultivated for the beauty of their large and brilliant flowers.

The name is from ἐρυθρος, in allusion to the color of the flowers.

C. S. S.

ERYTHRINA HERBACEA, VAR. ARBOREA, CHAPM.

ERYTHRINA HERBACEA, var. ARBOREA, Chapman, *Fl.* ed. 3, 117 (1897).
ERYTHRINA ARBOREA, Small, *Fl. Southeastern U. S.* 647 (1903).

Leaves persistent, usually from 1.5 to 2 decimetres long, with slender petioles and rachis occasionally armed with small recurved prickles; leaflets thin, deltoid to hastate, concave-cuneate at the broad base, the lateral lobes broad and rounded and much shorter than the elongated terminal lobe gradually narrowed and rounded at the apex, thin, yellow-green, smooth and glabrous, from 6 to 9 centimetres long and from 4 to 6 centimetres wide, their petiolules slender, from 5 to 6 millimetres in length with minute glandlike stipels. Flowers from 3 to 5 centimetres long, on short slender pedicels, in narrow axillary leafless racemes from 2 to 2.5 decimetres long, the lower flowers fading before those at the apex of the racemes open; calyx dark red, truncate and ciliate at the mouth, from 7 to 8 millimetres in length; corolla scarlet, the standard narrow, oblanceolate, gradually narrowing into the long base, about 4.5 centimetres long, closely infolded and then more or less falcate; wing-petals slightly longer than the calyx, and longer than the keel-petals; stamens diadelphous; pod compressed, constricted between the seeds, apiculate at the apex, from 1 to 1.2 decimetres long, gradually narrowed into a stout stipitate base often 2 centimetres long. Seeds compressed, bright scarlet, lustrous, 1 centimetre long and about 5 millimetres wide and thick, the dark hilum from 2.5 to 3 millimetres in length.

A tree,[1] rarely eight or nine metres high, with a tall trunk occasionally 3 decimetres in diameter, covered with smooth gray bark, small erect and spreading branches and slender yellow-green branchlets armed with short broad recurved spines; more often shrubby and, except in size and habit, not distinguishable from the herbaceous *Erythrina herbacea* of Linnæus.[2] Flowers in February and March. Fruit ripens in the autumn.

Florida: coast region from Miami, Dade County, to the southern shores of Tampa Bay, and on the southern keys.

C. S. S.

[1] The only really treelike Erythrina I have seen in Florida is growing on a shell mound on Terra Ceia Island in MacGill's Bay, one of the southern inlets from Tampa Bay.

[2] Linnæus, *Spec.* 706 (1753). — Chapman, *Fl.* 107 (1853). — Torrey & Gray, *Fl. N. Am.* i. 282. — Small, *Fl. Southeastern U. S.* 647.

Xyphanthus hederifolius, Rafinesque, *Fl. Ludovic.* 103 (1817).

This is an herb with slender spreading stems occasionally 1 metre long, common in sandy soil from the coast region of North Carolina to Florida, western Mississippi and Louisiana, and in the valley of the lower Rio Grande in Texas. A plant with herbaceous stems which sometimes under favorable conditions grows into a tree is certainly unusual.

EXPLANATION OF THE PLATE.

PLATE CXCIV. ERYTHRINA HERBACEA, var. ARBOREA.

1. A flowering branch, natural size.
2. A corolla displayed, enlarged.
3. An andrœcium, enlarged.
4. A pistil, enlarged.
5. A fruiting branch, natural size.
6. Portion of a fruit, natural size.
7. A seed, side view, enlarged.
8. A seed, ventral view.

C. E. Faxon del.

ERYTHRINA HERBACEA, var. ARBOREA, Chapm.

ACER SINUOSUM, REHD.

ACER SINUOSUM, *n. sp.*

Leaves suborbicular or semiorbicular in outline, broader than long, usually broadly cordate at the base, the wide sinus with a broad V-shaped projection at the insertion of the petiole, formed by the lateral veins diverging at right angles to each other and for some distance forming the margin of the leaf, from 3 to 7, usually from 3.5 to 4 centimetres long and from 3.5 to 7.5 centimetres broad, from three- to five-lobed, with short triangular-ovate to triangular-oblong obtuse lobes entire or on vigorous shoots with a few short teeth; when they unfold glabrous and purplish above, loosely hairy beneath, soon becoming glabrous, at maturity dark yellow-green and lustrous above, below pale but not glaucous, reticulate and glabrous except in the axils of the primary veins, prominently three- to five-nerved, the basal nerves of the five-nerved leaves merging into the upper lateral nerves before reaching the base; petioles glabrous, slender, from 1.5 to 3.5 centimetres in length. Flowers appearing with the leaves on slender glabrous pedicels from 1.5 to 3.5 centimetres long, in from three- to eight-flowered nearly sessile corymbs; calyx broadly campanulate or cupulate, yellowish, about 2 millimetres high and 3.5 millimetres wide, with short semiorbicular lobes ciliate on the margin, or sometimes campanulate, higher than wide, persistent under the fruit; petals wanting; stamens usually six, in the staminate flowers with slender filaments exceeding the calyx, from 3 to 4 millimetres long, in the pistillate flowers as long or shorter than the calyx; ovary with scattered long white hairs; style divided below the middle into two slender spreading stigmas. Fruit glabrous with nearly horizontally spreading nutlets from 7 to 8 millimetres long and about 5 millimetres broad, strongly convex, smooth, pale yellowish brown, wings curved upward, from 1.6 to 1.8 centimetres long and about 8 millimetres wide.

A shrub or tree, with a trunk covered with pale grayish bark, and slender branchlets at first light green and glabrous, becoming pale red-brown during their first season and marked by minute pale lenticels, purplish brown the second year and ultimately dull grayish brown. Winter-buds dark brown, small, obtusish, with six pairs of outer scales and several inner accrescent scarlet or pink scales, linear-oblong and from 1.5 to 3 centimetres long when fully grown.

Texas: Banks of the Cibolo River near Boerne, Boerne County, *S. H. Hastings*, 1911 (type, fruit), June 24, 1910 (fruits), *C. S. Sargent*, March 27, 1887; from a cultivated tree in the town of Boerne, *C. S. Sargent*, March 25, 1911, April 1, 1913.

This species is most closely related to *Acer floridanum* Pax, which is easily distinguished by the pubescent and glaucous under surface of its larger leaves with more or less dentate lobes and with a narrow sinus at the base. It is also near *Acer mexicanum* Gray, which, like our species, has the leaves nearly glabrous below at maturity, but they are truncate or rounded at the base and glaucescent below; the lobes, too, are more or less toothed as they are in *Acer floridanum*, and the wings of the fruit are upright and parallel.

This species is specially interesting because it is the only Sugar Maple with leaves in which the middle of the sinus is occupied by a projection formed by the veins of the two upper lobes which here form its margin. Its geographical isolation is also interesting, for *Acer leucoderme* Ashe on the Red River, *Acer grandidentatum* Nuttall on the mountains of the extreme western part of Texas, and *Acer mexicanum* Gray in Nuevo Leon are its nearest neighbors among the Sugar Maples.[1]

[1] The following varieties of allied species may be here characterized.

ACER FLORIDANUM, var. VILLIPES, *n. var.*

Petioles villose-tomentose with short spreading hairs; young branchlets covered with a more or less densely villose tomentum, sometimes persistent until the following season.

Georgia: Columbus, Muscogee County, *T. G. Harbison*, April 24, 1912 (No. 882, type, young fruit), same locality, *C. S. Sargent*, April 19, 1900; Waynesborough, Burke County, *C. S. Boynton*, September 2, 1902.

The specimens from Columbus agree well in shape and size of the leaves with the type of the species, while those from Waynesborough have much larger leaves, attaining a diameter of 12 centimetres, and the branchlets are glabrous.

ACER SACCHARUM, var. SCHNECKII, *n. var.*

Leaves five-lobed, subcordate or nearly truncate at the base, the lobes acuminate and dentate with a few large acuminate, acutish or obtuse teeth, rarely nearly entire, at maturity dark green and glabrous above, on the lower surface the veins densely clothed with spreading fulvous hairs, otherwise sparingly villose and glaucous or sometimes glabrescent; petioles densely villose with fulvous hairs.

Illinois: Mount Carmel, Wabash County, *C. S. Sargent* and *J. Schneck* (type), August 24, 1894, *J. Schneck*, September 10, 1894; Funnel Hill, Johnson County, *B. F. Bush*, October 8, 1912 (No. 6914). Missouri: Campbell, Dunklin County, *B. F. Bush*, July 24, 1895 (No. 74); *C. S. Sargent*, October 3, 1910; Williamsville, Wayne County, *C. S. Sargent*, October 1, 1900; *B. F. Bush*, October 14, 1905 (No. 3653), October 11, 1912 (No. 6953). Tennessee: Knoxville, Knox County, *C. S. Sargent*, September 17, 1888. Alabama: Tuscaloosa River, *C. Mohr*, May 11, 1898; Huntsville, Madison County (cultivated), *C. S. Sargent*, October 6, 1898.

This variety is easily distinguished from the type by the more or less dense pale fulvous pubescence of the petioles and of the under surface of the leaves, at least on the veins. The petioles are sometimes glabrous or nearly glabrous, and in none of the specimens seen are they as densely pubescent as in the type specimen. In the specimens from Campbell the leaves of the flowering shoots have quite or nearly entire broadly triangular lobes broader than high, the basal lobes often quite or nearly obsolete. By its pubescence this variety approaches *Acer floridanum* Pax; but is distinguished from it by its larger leaves with long-acuminate lobes, by the larger fruit and the dark color of the trunk. It merges gradually into typical *Acer Saccharum* Marshall, but seems to occupy a well defined geographical range.

ALFRED REHDER.

EXPLANATION OF THE PLATE.

PLATE CXCV. ACER SINUOSUM.

1. A flowering branch, natural size.
2. A staminate flower, enlarged.
3. A pistillate flower, enlarged.
4. A fruiting branch, natural size.
5. A fruit, natural size.

2

3

5

C. E. Faxon del.

ACER SINUOSUM, Rehd.

ÆSCULUS GLAUCESCENS, SARG.

ÆSCULUS GLAUCESCENS, *n. sp.*

Leaves five-foliate, their petioles stout, glabrous, from 1.2 to 1.8 decimetres in length; leaflets oblong-obovate to elliptical, acuminate and long-pointed at the apex, gradually narrowed and rounded or cuneate at the base, finely doubly serrate with short blunt teeth, dark green, lustrous and pubescent or puberulous along the midribs on the upper surface, glaucescent and glabrous or occasionally furnished with small tufts of axillary hairs on the lower surface, from 1.5 to 2.2 decimetres long and from 7 to 9 centimetres wide, with stout orange-colored midribs and from 25 to 30 pairs of slender primary veins, their petiolules stout, glabrous, from 1.2 to 1.4 centimetres in length. Flowers about 3 centimetres long, on stout glandular-pubescent pedicels, in broad scurfy-pubescent panicles; calyx campanulate, scurfy-pubescent on the outer surface, five-lobed, the lobes acute or rounded at the apex, glandular on the margins, puberulous on their inner surface; petals connivent, unequal, yellow, pubescent, ciliate on the margins, their claws villose, exceeding the calyx; limb of the superior pair obovate or suborbicular, rounded at the apex, cuneate at the base, those of the lateral pair much larger, broadly ovate, rounded or acute at the apex, cuneate at the base; stamens usually 7, rather shorter or as long as the petals; filaments villose; styles exserted, villose to the apex; ovary tomentose above the middle, pubescent below. Fruit subglobose, with thin light brown slightly pitted valves; seeds depressed subglobose, dark chestnut-brown, lustrous, about 2.5 centimetres in diameter, their hilum often 1.5 centimetres in diameter.

A shrub, from 2 to 3 metres high, with stout branchlets dark orange-green and puberulous when they first appear, becoming light brown, glabrous and marked by numerous small orange-green lenticels during their first season. Winter-buds ovate, obtuse, from 8 to 12 millimetres long, their scales light chestnut-brown, rounded and obtuse or acute at the apex. Flowers the middle of May. Fruit ripens from the middle to the end of September.

Georgia: on hills and ridges in forests of Oak and Hickory on freestone soil, near Cornelia,[1] Habersham County, *T. G. Harbison*, May 18 and October 8, 1911 (Nos. 619, type, 610, 618, 620), September 24, 1910 (No. 157); near Baldwin, Hall County, September 26, 1910 (No. 158).

C. S. S.

This handsome shrub differs from *Æsculus octandra* Marshall in habit, in its glabrous petioles, larger leaflets sometimes rounded at the base, less pubescent on the upper surface and pale and glabrous on the lower surface, in the generally longer petiolules and in the larger flowers. The calyx is broader, less deeply lobed and less pubescent; the filaments and styles of *Æsculus octandra* are less villose, the styles of *Æsculus glaucescens* being conspicuously villose to the apex. The fruit is much smaller than that of *Æsculus octandra;* the branchlets are as stout as or stouter than those of that species, and the winter buds are smaller.

[1] Cornelia is very near the Hall County line, and the corner of Banks County is also near Cornelia. Nos. 618, 619, and 620 were collected about three miles along the road from Cornelia to Homer, the county seat of Banks County, known as the Banks County Road.

EXPLANATION OF PLATE.

PLATE CXCVI. *ÆSCULUS GLAUCESCENS.*

1. A flowering branch, natural size.
2. Vertical section of a flower, natural size.
3. A lateral petal, enlarged.
4. A superior petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. A seed, natural size.

C. E. Faxon del.

ÆSCULUS GLAUCESCENS, Sarg.

ÆSCULUS GEORGIANA, SARG.

ÆSCULUS GEORGIANA, *n. sp.*

Leaves five-foliate, their petioles slender, glabrous, from 1.2 to 1.5 decimetres in length; leaflets oblong-obovate, abruptly acuminate and long-pointed at the apex, gradually narrowed and acuminate at the base, finely often doubly serrate with rounded teeth pointing forward, sparingly covered early in the season especially along the upper side of the midribs and veins with short caducous hairs, yellow-green above, green, glabrous and lustrous below, from 1.2 to 1.8 decimetres long and from 4 to 7 centimetres wide, with stout orange-colored midribs and from 20 to 30 pairs of slender primary veins, their petiolules stout, puberulous early in the season, from 5 to 10 millimetres in length. Flowers from 3 to 3.5 centimetres long, on slender puberulous pedicels, in broad pubescent panicles from 1 to 1.5 decimetres in length; calyx campanulate, puberulous, about 1 centimetre in diameter, red on the upper side, pale yellow-green on the lower side, five-lobed, the lobes oblong-ovate, narrowed and rounded at the apex, finely ciliate on the margins; petals connivent, obovate, rounded at the apex, gradually narrowed below, those of the superior and lateral pairs very unequal in size, puberulous and glandular on the outer surface, pubescent on the inner surface, ciliate on the margins, light yellow when the flowers open, becoming bright red, their claws furnished on the margins with long white hairs, those of the superior pair as long as the lateral petals; stamens 7, shorter than the petals, their filaments villose especially below the middle; ovary covered with matted pale hairs; styles exserted, villose. Fruit on stout pendulous pedicels, globose, usually 1-seeded, about 3 centimetres in diameter, with thin light brown slightly pitted valves; seed globose, dark chestnut-brown.

A broad round-topped shrub, from 1 to 2 metres high, with stout glabrous branchlets dark orange-green and marked by pale lenticels when they first appear, becoming light reddish brown during their first winters. Winter-buds obtuse, from 7 to 8 millimetres long, with light brown scales, narrowed, rounded and short-apiculate at the apex. Flowers in April and May. Fruit ripens in September.

Georgia: open fields and woods in the neighborhood of Stone Mountain, De Kalb County, common, *C. S. Sargent*, May 3, 1899, and April 16, 1900; *A. H. Curtiss*, May 9, 1901 (No. 6774 in Herb. Gray as *Æsculus flava*, var.); *T. G. Harbison*, September, 1905, April 30, 1912.

This shrub is well distinguished by its short compact inflorescence and red petals, and in the normal form by the glabrous leaflets. There is a form, however, growing with the type with leaflets covered below early in the season with loose pale pubescence which may be called —

Var. PUBESCENS, *n. var.*

Stone Mountain, Georgia, rare; *T. G. Harbison*, April, 1912 (Nos. 907, type, and 906).

This variety has appeared in the Arnold Arboretum among seedlings of the type, and both forms have flowered here and proved hardy and valuable garden plants.[1]

[1] The description of a probable hybrid of *Æsculus georgiana* with one of the red-flowered Eupaviæ species may be added here.

ÆSCULUS HARBISONI, *n. hyb.* (*Æsculus georgiana* × *discolor*, var. *mollis?*).

Leaves five-foliate, their petioles puberulous, tinged with red, from 1.2 to 1.8 decimetres in length; leaves oblong-obovate, acuminate at the ends, finely crenately serrate, early in the season bright yellow-green and pubescent on the midribs and veins above, paler and sparingly pubescent below, from 2.2 to 2.3 decimetres long and from 7 to 8 centimetres wide, with stout midribs and from twenty-five to thirty pairs of primary veins, their petiolules stout, puberulous, 1 centimetre in length. Flowers on stout pubescent red pedicels, in wide red puberulous panicles, about 1.5 decimetres long; calyx rose-colored, about 1.5 centimetres in

length and 5 millimetres in diameter; petals canary-yellow tinged with red toward the edges, glandular on the margins with minute red glands mixed with pale hairs ; stamens included ; fruit and mature leaves not seen.

A shrub, about 1 metre high. Flowers in the Arnold Arboretum from the 10th to the middle of June.

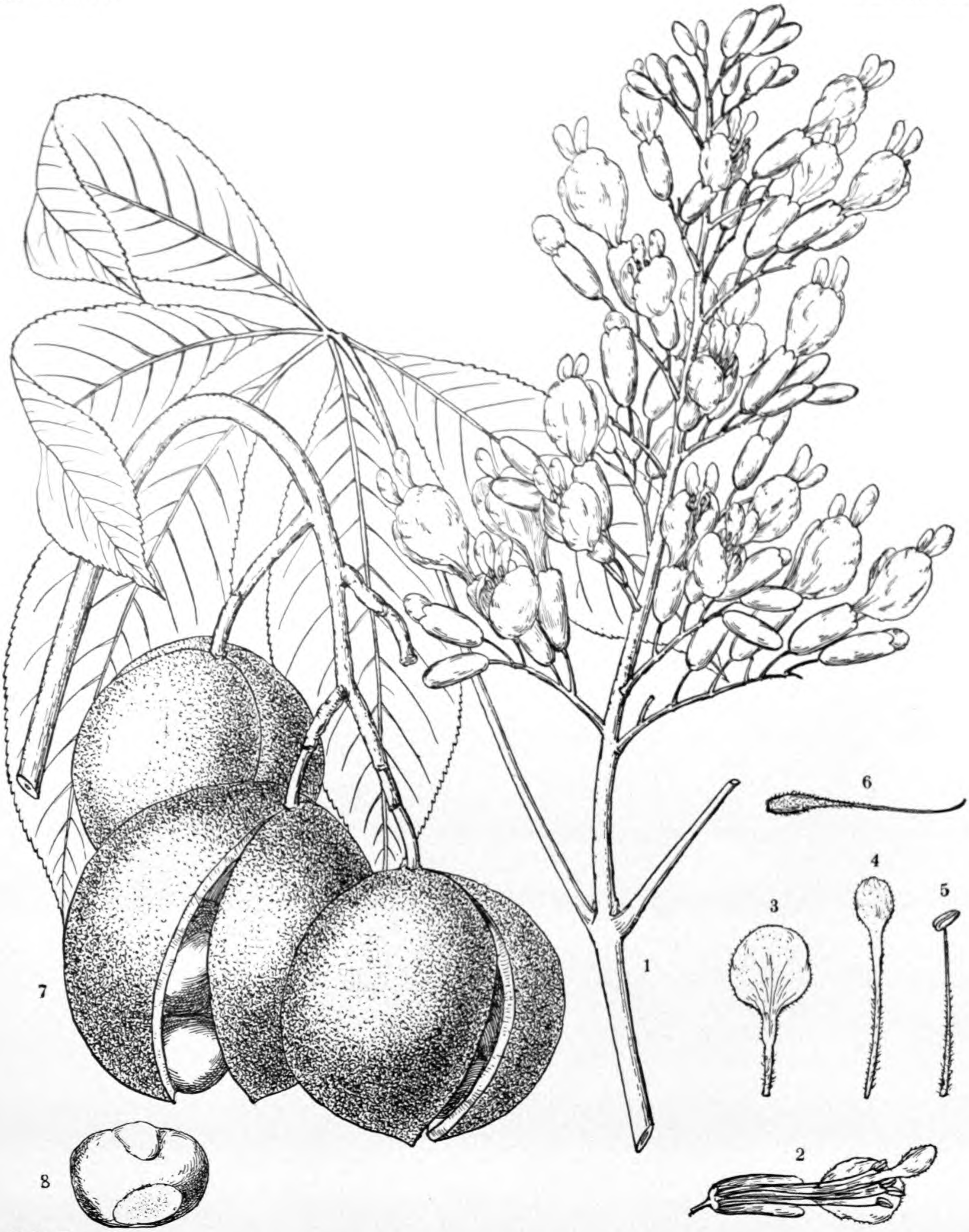
The mixture of hairs with glands on the margins of the petals show the hybrid origin of this plant. Two individuals have appeared in the Arnold Arboretum among a number of seedlings of *Æ. georgiana* raised from seeds collected in 1905 by Mr. T. G. Harbison near Stone Mountain in central Georgia. The pubescence on the lower surface of the leaflets suggests that the Eupaviæ parent is *Æ. discolor*, var. *mollis* Sargent, but as this pubescence is not more abundant than that found on the leaflets of *Æ. georgiana*, var. *pubescens* Sargent, it is possible that *Æ. Pavia* Linnæus may have been the red-flowered parent, both species occurring in central Georgia.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CXCVII. Æsculus georgiana.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A lateral petal, enlarged.
4. A superior petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. A seed, natural size.



C. E. Faxon del.

ÆSCULUS GEORGIANA, Sarg.

ÆSCULUS ARGUTA, BUCKL.

ÆSCULUS ARGUTA, Buckley, *Proc. Acad. Sci. Phila.* 1860, 443 (not *Pavia arguta* Rafinesque). — Young, *Fl. Texas*, 209. — Coulter, *Contrib. U. S. Nat. Mus.* ii. 65 (*Fl. W. Texas*).

ÆSCULUS GLABRA, var. ARGUTA, Robinson, Gray, *Syn. Fl. N. Am.* i. pt. i. 447 (in part) (1897).

Leaves seven- to nine-, usually nine-foliate, coated when they unfold like the flower-buds with hoary tomentum, their petioles stout, puberulous, from 1 to 1.8 decimetres in length; leaflets lanceolate to occasionally obovate-lanceolate, gradually or abruptly narrowed and acuminate and long-pointed at the apex, gradually narrowed, cuneate and entire at the base, sharply and often doubly serrate with straight teeth, light yellow-green, smooth or scabrate on the upper surface, pale and more or less pubescent on the lower surface, from 1 to 1.4 decimetres long, from 2 to 6, usually about 2.5, centimetres wide, their petiolules slender, puberulous early in the season, becoming glabrous, from 5 to 10 millimetres in length. Flowers about 1.5 centimetres long, on slender pedicels, in narrow many-flowered pubescent panicles from 1.2 to 2 decimetres long; calyx campanulate, pubescent, light yellow-green, about 6 millimetres in length, five-lobed, the lobes rounded, ciliate on the margins; petals nearly equal, oblong-obovate, gradually narrowed below into slender claws, pubescent on the outer surface, villose on the margins, pale yellow; stamens usually seven; filaments villose; ovary coated with long pale hairs, the style villose to the apex. Fruit on stout glabrous pedicels, subglobose, from one- to three-seeded, with thick dark brown echinate valves; seeds dark chestnut-brown, lustrous, about 2.5 centimetres in diameter.

A shrub, from 3 decimetres to 1.5 metres high, with numerous small stems often prostrate on the ground in the autumn from the weight of the abundant fruit, and slender branchlets light orange-green and puberulous when they first appear, light red-brown, puberulous, covered with a glaucous bloom and marked by pale lenticels during their first winter, and light yellow-brown and glabrous the following year. Winter-buds ovate, acute, from 1 to 2 centimetres in length, their scales acute, apiculate, reddish brown covered with a glaucous bloom.

Covering an open hillside near Larissa, Cherokee County, Texas, where it was discovered by Mr. S. B. Buckley before 1860. Texas: Larissa, *B. F. Bush*, April 30, 1909 (No. 5556, with young fruit), *C. S. Sargent*, March 24, and October, 1909. Rocky cliffs near Dallas, Dallas County, *J. Reverchon*, April, 1874 (in Herb. Gray), April and June, 1880 (No. 147, with 7 leaflets), *B. F. Bush*, November 15, 1905 (No. 3851, winter-buds); Oak Cliff, near Dallas, *C. S. Sargent*, March 23, 1910 (with 7 leaflets); Palestine, Anderson County, *E. N. Plank* (without date); Marshall's Bluff on Red River, twelve miles northwest of Dennison, Grayson County, *T. V. Munson*, March 20, 1910 (with 7 leaflets). Oklahoma: on Red River at Colbert's Ferry, northwest of Dennison, *T. V. Munson*, April 19, 1911.

This beautiful shrub, which has been so long misunderstood, seems distinct from all the forms of *Æsculus glabra* in its more numerous, narrower long-pointed leaflets and dwarf habit. At Larissa, where the plant covers many acres on a hillside, the leaflets are usually nine, although plants with seven leaflets occasionally occur. In the neighborhood of Dallas the leaflets appear to be usually seven, and on the Red River plants with seven and with nine leaflets grow together. [1]

[1] ÆSCULUS GLABRA, Willd. The form of this species which inhabits the rich bottom-lands near Courtney, Jackson County, Missouri, differs from the type in its usually seven narrower and more acuminate leaflets coated below like the young branchlets with close fine pale pubescence. This form is reported from Iowa, and it occurs at Manhattan, Riley County, Kansas. It was

on the Courtney plants that the variety *Buckleyi* was founded, for when this name was published nothing was known of Buckley's *Æsculus arguta*, which was supposed to be the same as the Missouri plant. The synonymy of this form is, —

ÆSCULUS GLABRA, var. BUCKLEYI, Sargent, *Man.* 645 (1905).

Æsculus glabra, var. *arguta*, Robinson, Gray, *Syn. Fl. N. Am.* i. pt. i. 447 (in part, not *Pavia arguta* Rafinesque nor *Æsculus arguta* Buckley) (1897).

Æsculus arguta, Mackenzie & Bush, *Man. Fl. Jackson County, Missouri*, 128 (1902). — Robinson & Fernald, Gray, *Man.* ed. 7, 560. — Daniels, *Fl. Columbia, Missouri*, 173 (not Rafinesque nor Buckley).

This tree has flowered for several years in the Arnold Arboretum, where it was raised from seeds sent by Mr. B. F. Bush from Courtney, Missouri. The leaves of the cultivated plants are more glabrous than those of the Courtney trees and often 5-foliolate.

Here are added descriptions of two new varieties of *Æsculus glabra*: —

ÆSCULUS GLABRA, var. LEUCODERMIS, *n. var.*

Leaves five-foliate, their petioles slender, glabrous; leaflets obovate-lanceolate to lanceolate, acute at the ends, finely or coarsely serrate, glabrous with the exception of the pubescence on the upper side of the midribs of young leaves, pale green or glaucescent and furnished on the lower surface with small axillary tufts of hairs, their petiolules short or elongated. Flowers and fruit as in the species.

A tree, occasionally from 18 to 20 metres high, with a trunk sometimes 4.5 decimetres in diameter, usually much smaller, and covered, like the branches, with smooth pale often nearly white bark, on old trees becoming light brown and separating in small oblong pale thick plates.

"Sand hills, Red River, eastern Texas," *Elihu Hall*, July,1 872 (No. 87 in Herb. Gray). Arkansas: woods, Fulton, Hempstead County, *C. S. Sargent*, April 18, 1901, March 26 and October, 1902, *B. F. Bush*, Aiprl 15, 1902 (No. 1358), April 17, 1905 (No. 2352), November 11, 1905 (No. 3838), April 5, 1909 (No. 5460), April 28, 1909 (No. 5541); Eureka Springs, Carroll County, *C. S. Sargent*, May 8, 1902. Missouri: banks of the Niangua River east of Buffalo, Dallas County, *C. S. Sargent*, May 14, 1902; Swan, Christian County, *B. F. Bush*, May 24, 1905 (No. 2962), May 17, 1907 (No. 4517), October 8, 1907 (No. 4855), *C. S. Sargent*, October, 1909.

This is the only yellow-flowered Æsculus I have seen in southern Missouri, and in Arkansas where it is common and where it grows to a larger size, so far as I have been able to observe, than in other parts of the country. It blooms later than *Æsculus glabra* in northern Missouri, and the pale smooth bark well distinguishes it from other forms of that tree, on which the bark of young individuals is dark brown and scaly, becoming on old trees thick, darker colored and deeply furrowed. The leaflets of the Fulton trees are green on the lower surface with the axillary tufts of hairs well developed, but in southern Missouri they are paler or glaucescent on the lower surface with smaller axillary tufts.

This variety, raised from seeds collected at Fulton by Mr. B. F. Bush, is established in the Arnold Arboretum and first flowered here in May, 1910.

ÆSCULUS GLABRA, var. MICRANTHA, *n. var.*

Leaves five-foliate, their petioles slender, glabrous, from 6 to 10 centimetres in length; leaflets lanceolate to oblong-lanceolate, acuminate and long-pointed at the apex, gradually narrowed and cuneate at the base, finely often doubly serrate and glabrous with the exception of minute tufts of axillary hairs, from 1 to 1.2 decimetres long and from 4.5 to 5 centimetres wide, their petiolules puberulous, from 4 to 8 millimetres in length. Flowers from 1 to 1.2 centimetres long, on slender puberulous pedicels, in narrow compact many-flowered corymbs; calyx campanulate, from 3 to 4 millimetres in diameter, dull red, five-lobed, the lobes ovate, rounded at the apex, ciliate on the margins; petals oblong-obovate, narrowed and rounded at the apex, ciliate on the margins, pale yellow; anthers exserted; filaments and styles sparingly villose. Mature leaves and fruit unknown.

A low shrub, borders of woods, Fulton, Hempstead County, Arkansas, *B. F. Bush* and *C. S. Sargent*, March 26, 1909.

The flowers of this variety are smaller than those of any other North American Æsculus. The color of the calyx suggests a possible hybrid between *Æsculus discolor*, var. *mollis* and *Æsculus glabra*, var. *leucodermis*, which were both common where these plants were growing. The leaves, however, show no trace of the pubescence of those of the former, and the margins of the petals are without the glands which appear in greater or less numbers on the margins of the petals of hybrids of species of the Eupavia subsection of Pavia. Possibly this variety should be considered a species; but without fruit and mature leaves, and as only two plants have been seen, it seems best to treat it as a variety of *Æsculus glabra*, especially as Mr. Bush and I found at Fulton in March, 1909, a plant with flowers equally small but with a yellow calyx, which perhaps should be referred to the same variety.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CXCVIII. *ÆSCULUS ARGUTA.*

1. A flowering branch, natural size.
2. Vertical section of a flower, the petals removed, enlarged.
3. A lateral petal, enlarged.
4. A superior petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. A seed, natural size.
9. Cross section of a seed, natural size.

C. E. Faxon del.

ÆSCULUS ARGUTA, Buckl.

ÆSCULUS PAVIA, L.

(Red-flowered Buckeye.)

Æsculus Pavia, Linnæus, *Spec.* 344 (1753). — Du Roi, *Harbk. Baumz.* i. 41. — Wangenheim, *Nordam. Holz.* 56. — Barton, *Elem. Bot.* Appx. 28, t. 15, f. 3. — Pursh, *Fl. Am. Sept.* i. 254. — Elliott, *Sk.* i. 435. — Loddiges, *Bot. Cab.* xiii. t. 1257. — Torrey & Gray, *Fl. N. Am.* i. 252 (excl. var. β). — Chapman, *Fl.* 79. — K. Koch, *Dendr.* i. 510. — Dippel, *Handb. Laubholzk.* ii. 403 (excl. var. a). — Koehne, *Deutsche Dendr.* 386. — Britton & Brown, *Ill. Fl.* ii. 402, f. 2385. — Robinson, Gray, *Syn. Fl. N. Am.* i. pt. i. 447 (in part, excl. syn.). — Small, *Fl. Southeastern U. S.* 739. — Robinson & Fernald, Gray, *Man.* ed. 7, 560 (in part). — Britton & Shafer, *N. Am. Trees*, 661, f. 614. — C. K. Schneider, *Ill. Handb. Laubholzk.* ii. 252, f. 175 c.

Pavia rubra, Lamarck, *Ill.* ii. 407 (in part), t. 273 (1793). — *Nouveau Duhamel*, iii. 154. — De Candolle, *Prodr.* i. 592. — Rafinesque, *Alsograph. Am.* 73.

Æsculus humilis, Loddiges ex Lindley, *Bot. Reg.* xii. t. 1018 (1826).

Pavia Michauxii, Spach, *Ann. Sci. Nat.* sér. 2, ii. 61 (1834); *Hist. Vég.* iii. 32, t. 18 (*Pavia rouge* on the plate).

Pavia longiflora, Rafinesque, *Alsograph. Am.* 72 (1838).

Æsculus Whitleyi of English gardens.

Leaves five-foliate, their petioles slender, glabrous or puberulous early in the season, from 1 to 1.8 decimetres in length; leaflets short-petiolulate,[1] oblong-obovate, acuminate, gradually narrowed and entire at the base, coarsely often doubly serrate above with incurved teeth, slightly pubescent early in the season along the upper side of the midribs and veins, and glabrous or slightly pubescent below,[2] and at maturity thin, lustrous and glabrous, dark green on the upper surface, pale yellow-green on the lower surface, often furnished with conspicuous tufts of axillary hairs, from 8 to 14 centimetres long and from 3 to 4.5 centimetres wide, with thin midribs and from eighteen to thirty pairs of slender primary veins. Flowers in narrow pubescent panicles from 1.2 to 2 decimetres in length, on slender pubescent pedicels; calyx tubular, dark red, puberulous on both surfaces, minutely lobed, the lobes rounded, much shorter than the lighter red petals; petals connivent, unequal, oblong-obovate, rounded at the apex, glandular on the outer surface and on the margins, gradually narrowed below into long slender villose claws; claws of the lateral petals about as long as or shorter than the calyx, those of the superior pair much longer than the calyx, their blades not more than one-third as large as the blades of the lateral pair; stamens exserted; filaments villose like the ovary. Fruit pear-shaped or subglobose, light brown, smooth, usually pitted, generally one- or two-seeded, drooping on slender pedicels; seeds usually about 2.5 centimetres in diameter, dark chestnut-brown and lustrous, with a small hilum.

[1] The petiolules are often not more than 5 millimetres long, but it is not uncommon to find them of twice that length; and on the large specimen at Mt. Vernon which, judging by its size and apparent age, may have been planted by Washington, the petiolules are sometimes 1.5 centimetres in length.

[2] The young leaflets are often entirely glabrous on the lower surface, but occasionally specimens occur on which the lower surface of the midribs and veins is more or less pubescent, and sometimes this pubescence is persistent during the season. The axillary tufts of hairs are by no means constant, and are entirely wanting on many specimens collected by Harbison in Alabama.

Usually a shrub, often flowering when not more than 1 metre high, or sometimes a tree rarely from 10 to 12 metres high,[1] with a tall trunk covered with smooth dark bark, large erect branches forming an open head, and stout light orange-brown branchlets marked in their second year by the conspicuous emarginate scars of fallen leaves showing the ends of three fibrovascular bundles. Flowers from the end of March to the middle of April. Fruit ripens in July and August.

Southern Virginia southward to northern Florida, and through the Gulf States to eastern Louisiana, and to southern Kentucky (near Bowling Green, Miss *S. Price* in Herb. Mo. Bot. Gard.).

From the first published description of this plant there has been misunderstanding in regard to it. Plukenet, who first described it, supposed that it was a native of Brazil, and Linnæus, following Plukenet, credited it to Brazil as well as to Carolina.[2] In Europe, where it appears to have been early cultivated, *Æsculus Pavia* has been the parent of a number of hybrids, probably with *Æsculus octandra* Marshall, and these hybrids, to which the name *Æsculus hybrida* should be given, have not always been distinguished from the species itself, while in the United States *Æsculus Pavia* has usually been confounded with other red-flowering species, especially with *Æsculus discolor*[3] and its varieties, which are now known to be common from Georgia to Texas and Arkansas, and to be the only red-flowered Æsculus in the region west of the Mississippi River with the exception of hybrid *Æsculus Bushii* of southern Arkansas. Linnæus had based his *Æsculus Pavia* on the descriptions and figures of some of the earlier authors. Of those, the figures of Plukenet and Boerhaave represent *Æsculus Pavia* fairly well, although they say nothing of the presence or absence of pubescence on the lower surface of the leaflets or of the color of the seeds. The figure in the *Catalogue of the Society of Gardeners* and that published by Trew were probably intended to represent *Æsculus Pavia*, although they certainly leave room for doubt.

In books published later than the appearance of the *Species Plantarum* of Linnæus in 1753 the figure in Schmidt's *Oesterreichs allgemeine Baumzucht* (i. t. 39), judging by the color of the seeds, is probably *Æsculus discolor*, var. *mollis;* the figure in Audubon's *Birds of America* (t. 78 and ed. 8°, ii. t. 117) clearly represents that plant. The figures in Guimpel, Otto & Hayne's *Abbildung der fremden in Deutschland ausdauernden Holzarten* (t. 21) represent a plant with a much broader calyx than that of *Æsculus Pavia*, probably a hybrid; and the figures of Watson (*Dendrologia Brittanica*, ii. 120) and of Lindley (*Botanical Register*, xii. t. 993) also represent hybrids.

The only figures which appear to represent *Æsculus Pavia* are the analytical drawings in Spach's *Histoire des Végétaux* (t. 18) which admirably show the structure of the flower, the colored plates in Loddiges's *Botanical Cabinet* (xiii. t. 1257) and in the *Botanical Register* (xii. t. 1018), and the small engravings in Britton & Brown's *Illustrated Flora* (f. 2385) and in Britton & Shafer's *Trees of North America* (f. 614). The figures of *Æsculus Pavia* in Gray's *Structural Botany* (f. 773–780) probably represent this species, although the filaments are without the hairs characteristic of them. The descriptions of Marshall (*Arbust. Am.* 5), Walter (*Fl. Car.* 128), Aiton (*Hort. Kew.* i. 494) and of Michaux (*Fl. Bor.-Am.* i. 219) may apply to *Æsculus Pavia* or to *Æsculus discolor* or its varieties.[3] C. S. S.

[1] This species was omitted from *The Silva of North America* because I did not know when the second volume was published that it ever became arborescent. In the woods near River Junction, Florida, I have since seen it, however, growing as a tree at least 8 metres tall and forming a trunk 1.5 decimetres in diameter, and near Mandeville in Saint Tammany Parish, Louisiana, Professor Cocks has shown me an old tree of this species nearly 15 metres tall with a trunk from 3 to 3.5 decimetres in diameter.

[2] *Saamouna Pisonis*, s. *Siliquifera Brasilianis Arbor digitatis foliis serratis, floribus Teucrii purpureis* Plukenet, *Alm. Bot.* 326, t. 56, f. 4 (1696).

Pavia, Boerhaave, *Ind. Alt. Pl. Hort. Lugd. Bat.* ii. 260, t. 260 (1727). — *Cat. Soc. Gardeners*, 53, t. 19. — Linnæus, *Hort. Cliff.* 143. — Royen, *Fl. Leyd. Prodr.* 463. — Trew, *Pl. Ehret*, 3, t. xv.

[3] ÆSCULUS DISCOLOR, *Pursh.*

This plant, which was discovered by Lyon in Georgia "probably in the western country," was described as a shrub, not more than four feet high, with "leaflets tomentose on the lower surface and flowers yellow, white and purple, variegated." This description has been the cause of much confusion. In 1818, four years after the publication of Pursh's Flora, Lindley figured an *Æsculus discolor* in *The Botanical Register* (t. 310). The figure shows a plant with included and slightly exserted stamens and a short broad calyx, evidently related to *Æsculus octandra*, and with yellow and red petals; the leaflets are described as covered below with a white woolly down. The plant from which this figure was made was cultivated in an English nursery and was said to have been introduced by Lyon. In 1824 De Candolle referred the *Æsculus discolor* of Pursh and Lindley to his *Æsculus hybrida*. This he first described in 1813 in his *Catalogus plantarum Horti botanici Monspeliensis*, 75, from specimens sent to him by Bosc and taken from a plant cultivated in the gardens of the Trianon. At this time this plant appeared to De Candolle to be a hybrid between *Æsculus lutea* (*octandra*) and *Æsculus Pavia*. In 1838 Torrey & Gray, in the *Flora of North America*, made a variety *discolor* of *Æsculus Pavia*, to which they doubtfully referred the plants of Pursh, Lindley and De Candolle, but in the second edition of his *Manual* published in 1857 Gray made for this plant the variety *purpurascens* of *Æsculus flava*, giving the range of his variety from western Virginia southward and westward. This disposition of *Æsculus discolor* has usually been fol-

lowed by later writers, although in *The Silva of North America* I adopted the name *hybrida* of De Candolle for Gray's *Æsculus flava*, var. *purpurascens*. The plate of *Æsculus discolor* prepared for Gray's unpublished *Silva of North America* probably represents one of the European hybrids of *Æsculus octandra*. I now believe there is no arborescent Æsculus with red flowers growing from West Virginia southward and westward, and that the Horsechestnuts sometimes cultivated as *Æsculus octandra*, var. *purpurascens*, with more or less red flowers, are hybrids of European origin, probably between *Æsculus octandra* and *Æsculus Pavia*. For these plants the oldest name is *Æsculus hybrida* De Candolle, which should supersede *Æsculus versicolor* Dippel.

The discovery by Harbison of a shrubby Horsechestnut in Alabama with leaves tomentose below and yellow and red flowers should settle the doubts about Pursh's *Æsculus discolor*. A similar plant was found by Bush near Campbell, Missouri, in the spring of 1812, and it is common at New Braunfels, Texas. The fruit of Harbison's plant unfortunately has not been collected, but that of the Missouri and Texas plants has seeds of the peculiar light yellow-brown color of those of the so-called *Æsculus austrina*, and as Harbison's plant was growing with this, as were the Missouri and Texas plants, I think it is safe to assume that the seeds were similar. The synonymy of this species is —

ÆSCULUS DISCOLOR, Pursh, *Fl. Am. Sept.* i. 255 (1814).

Æsculus Pavia, β *discolor*, Torrey & Gray, *Fl. N. Am.* i. 252 (in part) (1838). — Gray, *Jour. Boston Soc. Nat. Hist.* vi. no. ii. 167 (*Pl. Lindheim.* ii.) (in part).

Alabama: Selma, Dallas County, *T. G. Harbison*, April 12, 1912 (No. 838); Birmingham, Jefferson County, April 24, 1912 (Nos. 873 & 880). Missouri: Campbell, Dunklin County, *B. F. Bush*, April 12, 1912 (No. 6616), *B. F. Bush* and *C. S. Sargent*, October, 1912. Texas: Comal Springs, New Braunfels, Comal County, *C. S. Sargent*, March 24, 1911, *S. H. Hastings*, April 4, 1912; Sutherland Springs, Wilson County, *C. S. Sargent*, March 30, 1913.

The common red-flowered Æsculus of the lower Mississippi valley, which cannot be specifically separated from *Æsculus discolor*, becomes —

ÆSCULUS DISCOLOR, var. MOLLIS, *n. var.*

Æsculus Pavia, Schmidt, *Oesterr. Baumz.* i. 40, t. 39 (not Linnæus) (1792). — Audubon, *Birds*, t. 78, ed. octavo. ii, t. 117. — Robinson and Fernald, Gray, *Man.* ed. 7, 560 (in so much as relates to Missouri).

Æsculus mollis, Rafinesque, *Alsograph. Am.* 71 (1838).

Æsculus Pavia, β *discolor*, Torrey & Gray, *Fl. N. Am.* i. 252 (in part, not *Æsculus discolor* Pursh) (1838). — Gray, *Jour. Boston Soc. Nat. Hist.* vi. no. ii. 167 (*Pl. Lindheim.* ii.) (in part) (1850).

Æsculus octandra, var. *hybrida*, Sargent, *Silva N. Am.* ii. 60 (in part, not *Pavia hybrida* De Candolle) (1891). — Robinson, Gray, *Syn. Fl. N. Am.* i. pt. i. 447 (in part).

Æsculus austrina, Small, *Bull. Torrey Bot. Club*, xxviii. 359 (1901); *Fl. Southeastern U. S.* 739. — Sargent, *Silva N. Am.* xiii. 3, t. 622; *Man.* 647, f. 528. — Britton & Shafer, *N. Am. Trees*, 660, f. 613. — C. K. Schneider, *Ill. Handb. Laubholzk.* ii. 253.

Although he does not mention the seeds, Rafinesque in his description leaves no doubt of the identity of *Æsculus mollis* with the *Æsculus austrina* of Small, especially as it was based on specimens collected by Nuttall in Arkansas, where this plant is very common and where Nuttall could have collected no other red-flowered Æsculus with leaflets "subtus concolor mollis villosis."

Æsculus discolor, var. *mollis*, is now known to be common in the neighborhood of Rome and Augusta, Georgia, and at Alabama City, Talladega Springs, Birmingham, near Selma, and at Tarvers, Alabama. It is distributed therefore from northern Georgia through central Alabama, and through Louisiana to the valley of the Guadaloupe River in Texas, and through Arkansas to southeastern Missouri and southwestern Tennessee. All the published references to *Æsculus Pavia* in the region west of the Mississippi River probably refer to this plant or to *Æsculus discolor*, as *Æsculus Pavia* is not now known to range west of Kentucky and eastern Louisiana.

A variety of *Æsculus discolor* with pale yellow flowers may be called —

ÆSCULUS DISCOLOR, var. FLAVESCENS, *n. var.*

Æsculus Pavia, β *discolor*, Gray, *Jour. Boston Soc. Nat. Hist.* vi. no. ii. 167 (*Pl. Lindheim.* ii.) (in part) (1850).

Æsculus flava, Coulter, *Contrib. U. S. Nat. Herb.* ii. 65 (*Fl. Western Texas*) (not Aiton) (1891).

Æsculus octandra, Sargent, *Silva N. Am.* ii. 60 (in so far as relates to Texas) (not Marshall) (1891). — Robinson, Gray, *Syn. Fl. N. Am.* i. pt. i. 447 (in so far as relates to Texas). — Small, *Fl. Southeastern U. S.* 740 (in so far relates to Texas).

Texas: Comal Springs, New Braunfels, Comal County, *F. Lindheimer*, 1850 (No. 725), *C. S. Sargent*, March 24, 1911, *S. H. Hastings*, April 4, 1912, *B. Mackensen*, April 12 and October 13, 1912; near Boerne, Kendall County, *S. H. Hastings*, June 24, 1910; near Kerrville, Kerr County, *C. S. Sargent*, April 2, 1913, *P. Lacey*, May, 1913; San Marcos, Hays County, *S. H. Hastings*, April 3, 1912.

This plant is of considerable interest, as it is the only one of the *Eupaviæ* with yellow flowers. It is very common on the slope above the Comal Spring, where it is a shrub with erect stems, sometimes from 3 to 4 metres high, and appears to be confined to the Edwards Plateau formation, on which it is usually the only form, although occasionally a plant of the red-flowered variety occurs in the neighborhood of Boerne. It flowers a few days earlier than *Æsculus discolor* and its variety *mollis*, which are both common just below it at Comal Springs. The pubescence on the under surface of the leaflets, the glands on the margins of the petals and the color of the seeds are the same in these plants, and they can only be distinguished by the color of the flowers, which in all the three forms vary in the width of the calyx. Growing here with *Æsculus discolor* and its variety *mollis* there are plants with very beautiful rose-colored petals, which show the tendency of this species to vary in the color of the flowers.

A very dwarf plant (*Æsculus nana* Koehne, not Loddiges), sometimes cultivated as *Æsculus Pavia rosea nana* Hort., and not

rare in collections, is perhaps a form of *Æsculus discolor*. I have not seen the seeds, however, and it is not now known in a wild state. All descriptions of *Æsculus discolor* in recent European dendrological works refer, I believe, to hybrids of *Æsculus octandra* and *Æsculus Pavia* or *Æsculus discolor*, var. *mollis*, and the plants found in collections uuder the name of *Æsculus discolor* are usually also hybrids.

Here is added the description of another red-flowered Æsculus : —

Æsculus Bushii, C. K. Schneider, *Ill. Handb. Laubholzk.* ii. 251 (1909).

Leaves five-foliate, their petioles stout, puberulous, becoming glabrous, from 1.2 to 1.4 decimetres in length; leaflets oblong-obovate, acuminate, usually abruptly long-pointed at the apex, cuneate at the entire base, finely often doubly serrate above, with straight or incurved teeth; early in the season light yellow-green, puberulous on the upper side of the midribs and paler and pubescent below, especially on the midribs and veins, thin and glabrous at maturity, from 1 to 1.4 decimetres long and from 4.5 to 7 centimetres wide, with stout light yellow midribs and usually from 16 to 18 pairs of slender primary veins; petiolules stout, puberulous, becoming glabrous, from 4 to 6 millimetres in length. Flowers 2.5 centimetres long, on slender puberulous pedicels in narrow compact scurfy-pubescent panicles; calyx campanulate, bright pink, puberulous on the outer surface, glabrous on the inner surface, about 1 centimetre long, five-lobed, the lobes ovate, rounded, glandular and ciliate on the margins; petals ovate to obovate, those of the superior and lateral pairs very unequal in size, pink and yellow, puberulous and glandular on the outer surface, furnished on the margins with glands intermixed with occasional hairs, their claws slightly ciliate on the margins; stamens seven, exserted; filaments slightly villose, like the ovary and style. Fruit subglobose to broad-obovate, many-seeded, with thin dark brown smooth or slightly and irregularly echinate valves; seeds dark chestnut-brown, very unequal in size, usually from 2 to 3, sometimes from 4 to 4.5, centimetres in diameter.

A tree, from 10 to 12 metres high, with a trunk from 4 to 5 decimetres in diameter covered with dark scaly bark, short stout branches making a narrow round-topped head, and stout branchlets light reddish brown and puberulous and marked by small pale lenticels when they first appear, becoming glabrous and darker-colored during their second year. Winter-buds acute, from 1 to 2 centimetres long, with light brown acute apiculate scales.

Arkansas : borders of woods, near Fulton, Hemstead County, *B. F. Bush* and *C. S. Sargent*, April 18, 1901, *B. F. Bush*, October 17, 1901, and April 15, 1902 (1457, type).

Schneider's suggestion that this tree is a hybrid between *Æsculus austrina* (*discolor*, var. *mollis*) and *Æsculus glabra* is perhaps the correct one. *Æsculus discolor*, var. *mollis*, and *Æsculus glabra*, var. *leucodermis*, are very common at Fulton. On the margins of the petals on the type specimen of *Æsculus Bushii* there are a few hairs only scattered among the conspicuous glands, while on the plant raised in the Arnold Arboretum from seeds gathered by Mr. Bush from one of the Fulton trees the margins of the petals are densely ciliate and show no trace of glands. The calyx of *Æsculus Bushii* is like that of *Æsculus glabra* except in color, and the unequal petals are in shape those of *Æsculus discolor* var. *mollis*. The color of the flowers shows the influence of the two species. The fruit is as large as that of *Æsculus discolor*, var. *mollis*, but dark-colored and either smooth or roughened by the tubercle-like base of prickles. The seeds show no trace of the peculiar color of those of *Æsculus discolor*, var. *mollis*, and are of the normal color of Horsechestnut seeds. The leaves of the plant cultivated in the Arnold Arboretum are sometimes seven-foliate, and the leaflets of this plant are covered below with the soft pale pubescence of *Æsculus discolor*, var. *mollis*.

In recent visits to Fulton neither Mr. Bush nor I have succeeded in finding the trees of *Æsculus Bushii*, which have possibly been destroyed, and it is not impossible that the single tree growing in the Arnold Arboretum is now the only representative of this hybrid.

C. S. S.

EXPLANATION OF THE PLATE.

Plate CXCIX. Æsculus Pavia.

1. A flowering branch, natural size.
2. Vertical section of a flower, enlarged.
3. A lateral petal, enlarged.
4. A superior petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruiting branch, natural size.
8. A seed, natural size.

C. E. Faxon del.

ÆSCULUS PAVIA, L.

ÆSCULUS SPLENDENS, SARG.

ÆSCULUS SPLENDENS, *n. sp.*

Leaves five-foliate, their petioles slender, puberulous, from 9 to 12 centimetres in length; leaflets lanceolate to oblanceolate, acuminate at the ends, finely often doubly crenulate-serrate, yellow-green, puberulous along the upper side of the midribs, densely hoary-pubescent or late in the autumn rufous-pubescent on the lower surface, from 8 to 14 centimetres long and from 4 to 5 centimetres wide, their petiolules pubescent, from 5 to 8 millimetres in length. Flowers from 3.5 to 4 centimetres long, on pubescent pedicels, in many-flowered puberulous panicles from 2 to 2.5 decimetres in length; calyx tubular, from 7 to 8 millimetres in diameter, bright red, puberulous on the outer surface, glabrous on the inner surface, deeply five-lobed, the lobes narrowed and rounded at the apex, glandular on the margins; petals connivent, very unequal, pubescent and glandular on the back, glandular on the margins, their claws slightly villose on the inner surface; blades of the petals of the superior pair suborbicular to obovate, about 6 millimetres in diameter, gradually narrowed below into claws as long as the lateral petals; these slightly shorter than the calyx, their blades oblong-obovate, rounded at the apex, gradually narrowed below, about 1.5 centimetre in length; stamens usually seven, longer or shorter than the petals; filaments sparingly villose below the middle; style exserted, villose toward the base. Fruit subglobose to short-obovate, the valves thin, light brown, deeply pitted; seeds dark chestnut-brown, lustrous, from 3 to 3.5 centimetres in diameter.

A shrub, from 3 to 4 metres high, with slender branches dark reddish brown and puberulous when they first appear, becoming glabrous and dull orange-brown at the end of their first season; winter-buds acute, from 6 to 7 millimetres long, with light chestnut-brown acute apiculate scales. Flowers in April and May. Fruit ripens in September.

Alabama: among Oaks and Hickories in moist calcareous soil overlying limestone, near and east of Attalla, Etowa County, *T. G. Harbison*, May 5 and September 9, 1911 (Nos. 545 & 666, type); on the road to Lookout Mountain, about three miles east of Alabama City, Etowa County, on the slope of a rocky ridge in limestone soil, *T. G. Harbison*, May 6 and September, 1911 (No. 561, with larger leaflets and even larger flowers); near Birmingham, Jefferson County, *T. G. Harbison*, April 22, 1912 (No. 871). Mississippi: roadsides, Natchez, Adams County, *C. S. Sargent*, April 8, 1913; common. ? Louisiana: Winnfield, Winn Parish, *R. S. Cocks* and *C. S. Sargent*, April 6, 1913.

The flowers of this shrub are probably the handsomest of all the Horsechestnuts. In the pubescence on the lower surface of the leaflets it resembles *Æsculus discolor* Pursh, but the leaves are generally lanceolate and only occasionally broadest above the middle, while in *Æsculus discolor* they are usually oblong-obovate with shorter petiolules than those of *Æsculus splendens*. The flowers are larger in this species and the calyx is broad, although the breadth of the calyx is a very uncertain character in the red-flowered species of Æsculus, flowers with a broad and those with a narrow calyx sometimes occurring on the same plant. The best character, however, by which this species can be distinguished

from *Æsculus discolor* is in the color of the seeds, which are of the usual color of Horsechestnut seeds, while those of *Æsculus discolor* are light orange-brown and unlike those of any other species.[1]

[1] KEY TO THE SPECIES OF ÆSCULUS OF THE SECTION PAVIA PERSOON.

Subsection OCTANDRÆ, *n. subsect.* Calyx campanulate, margins of the petals ciliate, eglandular; flowers usually yellow.

Petals unequal, longer than the stamens; fruit smooth.

Flowers yellow.

Leaflets from 5 to 7, cuneate at the base, green and glabrous or pale or rusty pubescent below, short-petiolulate; pistils villose only at the base; a tree. Æ. OCTANDRA.

Leaflets 5, often rounded at the base, glabrous and glaucescent below, their petiolules up to 1.4 cm. in length; pistils conspicuously villose to the apex; a low shrub. Æ. GLAUCESCENS.

Flowers red and yellow; leaflets 5, glabrous, green and lustrous below, or pubescent below in var. *pubescens*. Æ. GEORGIANA.

Petals nearly equal, shorter than the stamens, fruit tuberculate; flowers yellow.

Leaflets from 5 to 7, usually 5, elliptical or obovate, glabrous below; a tree. Æ. GLABRA.

Leaflets from 7 to 9, usually 9, lanceolate or rarely obovate-lanceolate, more or less pubescent below; a low shrub. Æ. ARGUTA.

Subsection EUPAVIÆ, *n. subsect.* Calyx tubular, margins of the petals glandular, without hairs; flowers usually red.

Seeds dark chestnut brown.

Leaflets oblong-obovate, glabrous, often furnished below with conspicuous tufts of axillary hairs; a tree or shrub. Æ. PAVIA.

Leaflets lanceolate to oblanceolate, densely pubescent below. Æ. SPLENDENS.

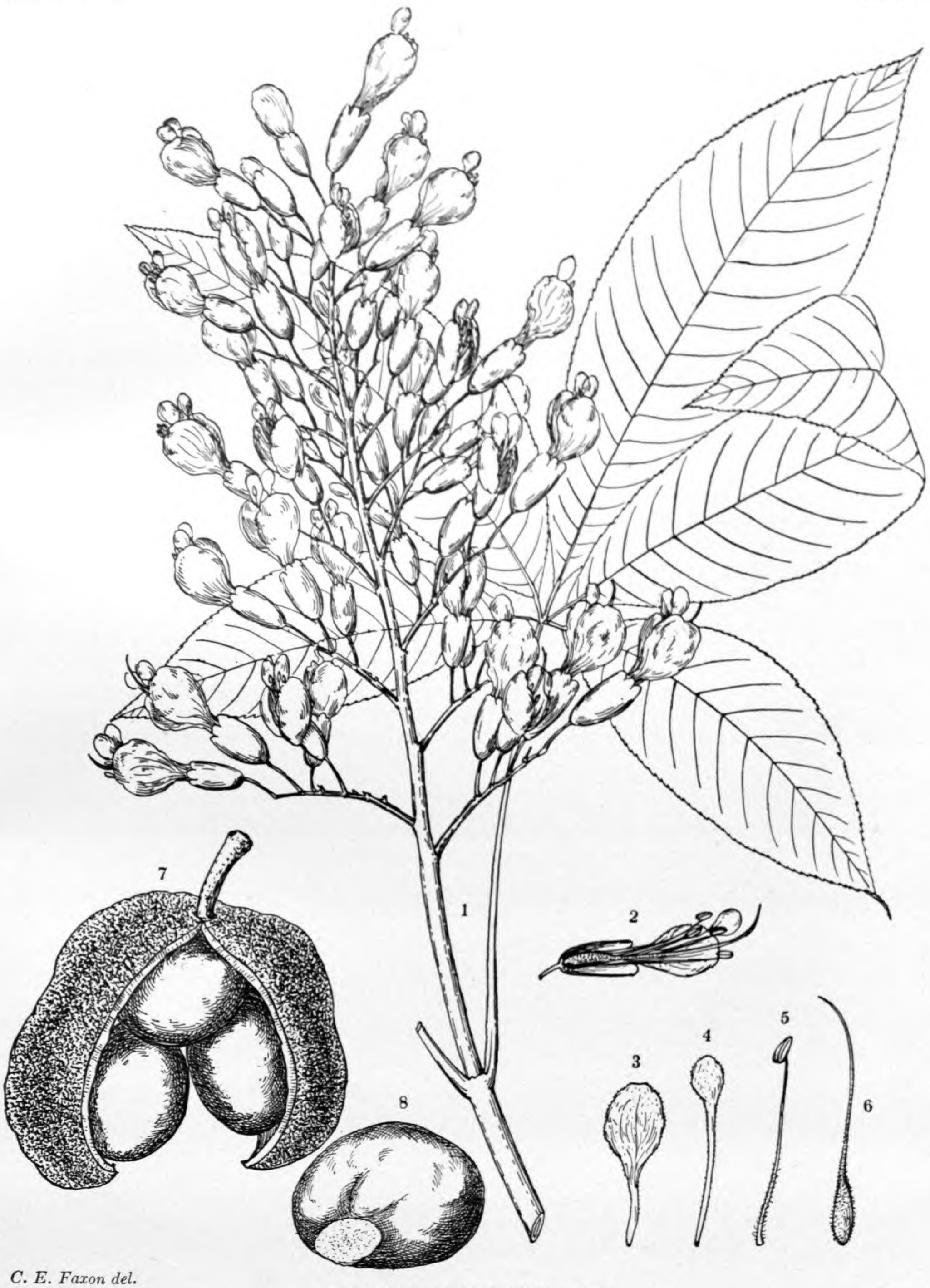
Seeds light yellow-brown; flowers red and yellow or red in var. *mollis* and pale yellow in var. *flavescens*; leaflets hoary tomentose on the lower surface. Æ. DISCOLOR.

C. S. S.

EXPLANATION OF THE PLATE.

PLATE CC. ÆSCULUS SPLENDENS.

1. A flowering branch, natural size.
2. Vertical section of a flower, natural size.
3. A lateral petal, enlarged.
4. A superior petal, enlarged.
5. A stamen, enlarged.
6. A pistil, enlarged.
7. A fruit, natural size.
8. A seed, natural size.



C. E. Faxon del.

ÆSCULUS SPLENDENS, Sarg.

CORRECTIONS.

ACER ROBUSTUM (p. 26). *Acer flabellatum* Rehder is not a synonym of *A. robustum*, as it appeared to me after a rather hurried inspection of Giraldi's specimens at Florence, where I was not able to compare it actually with *A. robustum*. Later I was able to compare ample material of the species collected by E. H. Wilson, which proved that they are perfectly distinct. See also Sargent, *Plantæ Wilsonianæ*, i. 89, 91.

RHODODENDRON KAEMPFERI (p. 29). Some of the flowers figured on the plate are drawn with more than five stamens. This is a mistake; the species has never more than five stamens, as correctly stated in the description.

VIBURNUM (p. 106). In the conspectus of the species the distinguishing character of the first two species should read, —

Leaves glabrous beneath; panicles many-flowered.	1. V. FRAGRANS.
Leaves pubescent on the veins beneath; panicles few-flowered.	2. V. NERVOSUM.

VIBURNUM ODORATISSIMUM (p. 107). Add as a synonym *Viburnum dubium* Steudel, *Nomencl. Bot.* ed. 2, 762 (1841).

VIBURNUM TOMENTOSUM (p. 108). The references to Schmidt and to Herder, quoted under the synonym *Viburnum plicatum*, belong to *V. furcatum* and not to *V. tomentosum*.

VIBURNUM CARLESII (p. 110). Add as a synonym *Viburnum bitchiuense* Makino, *Bot. Mag. Tokyo*, xxiii. 251.

VIBURNUM BUREJÆTICUM (p. 110). The first citation should read: Regel & Herder, *Gartenflora*, xi. 407, t. 384 (1862).

VIBURNUM BITCHIUENSE (p. 111). Transfer as a synonym to *V. Carlesii*.

A. Rehder.

INDEX TO VOLUMES I. AND II.

Names of admitted Genera and Species are in roman type; of Synonyms, in *italics*.

The Riverside Press
CAMBRIDGE . MASSACHUSETTS
U . S . A

SILVA OF NORTH AMERICA

IN September, 1890, Messrs. Houghton, Mifflin & Company announced the publication of Sargent's *Silva of North America* in twelve quarto volumes, illustrated with six hundred plates engraved in Paris under the direction of A. Riocreux from drawings made by C. E. Faxon. The last of these volumes was published in January, 1899, the twelve volumes containing six hundred and twenty plates.

The publication of this exhaustive and monumental work has stimulated the study of trees in the United States in a remarkable and gratifying manner, and during its progress the number of trees recognized by botanists in North America north of Mexico, the region covered by the *Silva*, has increased to 567 from 422, the number announced in Messrs. Houghton, Mifflin & Company's circular of 1890. For this reason two supplementary volumes were added, containing 115 new plates and a thorough index of the entire work. They were published in the fall of 1902, thus completing the set.

Professor Sargent is recognized as the highest authority on the subject he treats. His position as Director of the Arnold Arboretum of Harvard University, the richest dendrological collection in America, which has been formed by him, and his opportunities while in the employ of the government of the United States for exploring the forests and studying the trees in every part of the country, opportunities supplemented by his connection with the Northern Transcontinental Survey, and by the duty intrusted to him of forming for the New York Museum of Natural History a collection to illustrate the forest products of North America, specially qualify him for this work, in the preparation of which he has been actively engaged during the last twenty-five years.

No cost or pains have been spared in the mechanical execution of the illustrations of this work, which has taken the first rank among those great scientific works of which Americans are justly proud. It must always remain a standard authority on the subject which it treats.

The price of the *Silva* is $25 net a volume, or $350 for the set, and only subscriptions for the entire work will be accepted.

Specimen pages and a sample plate will be submitted upon request. Address,

HOUGHTON MIFFLIN COMPANY,
4 Park St., Boston.

MANUAL OF THE TREES OF NORTH AMERICA

(EXCLUSIVE OF MEXICO)

THIS volume contains brief descriptions in plain and simple language of some 630 trees, accompanied by a figure of the leaves, fruits, and flowers of each tree, with keys leading to a ready determination of the genera and species. The illustrations are a feature of the book. They are reproductions of drawings made by Mr. Charles E. Faxon, the artist who made the illustrations for "The Silva of North America," and exhibit in a remarkable degree his skill, knowledge, and taste, — the salient or more characteristic features of each species being shown in an admirable manner.

Professor Sargent's descriptions bring out the botanical characters of each genus and species, its geographical distribution and economic value, and its relationship to other species of the same group growing in other parts of the world. The book represents in condensed form the life-work of the author and of the artist in studying, describing, and illustrating the trees of North America, which they have succeeded in making known as the trees of no other continent are known.

The Manual makes available in convenient form the most essential points of the treasures of information to be found in "The Silva of North America." It will be indispensable to every one interested in nature, but especially to all

BOTANISTS, TEACHERS, FORESTERS,
LANDSCAPE-GARDENERS, HORTICULTURISTS,
NURSERYMEN, PARK SUPERINTENDENTS,
AND THE OWNERS OF COUNTRY PLACES.

As a convenient handbook it will serve as a guide to the trees to persons traveling in different parts of this country. Professor Sargent is, without doubt, the greatest living authority on his subject, and his new work will fill a place similar to that long held by Gray's Manual of Botany.

"An admirable book in every way by a past master in his subject, a book that goes straight to the foundations and that every one that loves trees must have." — *New York Sun.*

"A close study of its pages reveals Professor Sargent's careful methods of work, his accuracy, his clear descriptive powers, his exactitude of statement and his marvellous, wide, and minute knowledge of every branch of the subject. . . . Its standard position as the one authoritative record of North American trees is unquestioned." — *Boston Evening Transcript.*

WITH 644 ILLUSTRATIONS BY C. E. FAXON

In green buckram, 8vo, $6.00, *net.* Postpaid.

Specimen pages and a sample plate will be submitted upon request. Address

HOUGHTON MIFFLIN COMPANY
4 Park Street, Boston